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PRACTICAL GYNECOLOGY

A COMPREHENSIVE TEXT-BOOK FOR STUDENTS AND PHYSICIANS

BY

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MEDICAL COLLEGE AND ST. JOSEPH'S HOSPITALS; CONSULTING GYNECOLOGIST
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TO

Dr. W. H. Warder,

MY CONSCIENTIOUS INSTRUCTOR AS QUIZ-MASTER AND HOSPITAL CHIEF,

AND MY GENEROUS FRIEND,

THIS BOOK IS RESPECTFULLY DEDICATED.

W M787
1900

PREFACE.

I will offer no apology for presenting an additional text-book upon gynecology.

This work has been under consideration for the last fifteen years, and much of it has been several times rewritten. An effort has been made to make it a comprehensive work upon the subject, giving the experience and methods of the most careful men, while my own experience has been utilized to indicate that which I have found most useful and worthy of acceptance.

Each general subject is considered with reference to its influence upon the entire genital tract, and the work is divided into sections rather than chapters. This course, although a departure from the ordinary text-book arrangement, is that which experience has demonstrated to be most effective in impressing the subject upon the student, and would seem to me preferable to him who uses the book to refresh his knowledge upon any particular subject. The illustrations are arranged solely with the purpose of rendering clear the text and to promote the work of diagnosis and treatment. For their excellence and character I am greatly indebted to the generosity of the publishers and to the skill and patience of their artists, Messrs. Shannon and Von du Lancken. To the kindly oversight of Dr. Robert L. Dickinson is due much of the exactness of the drawings. Acknowledgment is due Miss Eleanor A. Cantner for her ability in the preparation of preliminary sketches and of the index.

Should it be the means of lightening the work of the student, of making more clear the pathway of the busy practitioner, and, most of all, of benefiting suffering women through improved methods of diagnosis and treatment, I shall feel well repaid for the many days and nights of labor which it has cost

THE AUTHOR.

PHILADELPHIA, *August, 1900.*

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A

TEXT-BOOK OF GYNECOLOGY.

INTRODUCTION.

1. **Definition and Antiquity.**—Gynecology comprises the study of the diseases of women. While it is doubtless true that some of the diseased conditions of the female genital tract were known to the ancients, as demonstrated by the description of the sound and of various specula, as well as the directions for the treatment of special conditions, it is, nevertheless, certain that the most marked development of the science has taken place during the nineteenth century.

2. **Theories.**—The study of its progress is not without interest and profit, and in its development we witness the pendulum swing from one extreme to the other. The origin of disease is based upon local inflammation by one; by another it is ascribed to constitutional conditions of which the local condition is only an expression. The cervix has been considered the offending portion of the tract, and its inflammation the cause of every trouble. The ovaries have been accused of dominating the other organs, and producing in them secondary or reflex phenomena. Displacements of the uterus, particularly the flexions, have been, and still are, accused of being the main source of the disorders of the pelvis. To the tubes has been assigned the function of menstruation, and consequently to pathologic lesions of these organs are attributed the majority of abnormal conditions of the genital tract.

3. **Foundation.**—When we come to analyze the different theories which have been presented, we find the truth is contained not in one, but in a proper combination of all. The influence of the organs upon each other, due to the arrangement of vascular and nerve supply, is significant, and a proper appreciation of the

science is attained only by a very careful study and analysis of all the phenomena presented.

4. **Purpose.**—It should not be considered the true province of gynecology, on the one hand, to ascertain that the patient has a uterus and then to proceed with routine use of speculum, sound, and applicator, nor, on the other, after having demonstrated the existence of the ovaries and tubes, to conclude that every symptom of distress or discomfort of which the patient complains must be due to a pathologic lesion in these organs which, of necessity, justifies their sacrifice. The gynecologist must be one who will be patient in eliciting the subjective symptoms and proficient in determining physical signs, and who will exercise correct judgment in comparing and analyzing the knowledge thus secured; one who has such integrity that the patient may feel assured she will not be treated for diseased conditions which are not present.

He must be so conservative that he will sacrifice no organ whose physiologic integrity is capable of being restored; so bold and courageous that his patient shall not forfeit her opportunity for life or restored health through his failure to assume the responsibility of any operative procedure necessary to secure the object.

5. **Difficulties in Study.**—The importance of correct diagnosis can not be too strongly affirmed, yet probably in no department of medicine are interposed greater barriers to its accomplishment. In the study of the diseases of women much must depend upon proficiency of touch, which can be acquired only by extensive practice. The delicacy and proficiency of this sense varies so greatly in different individuals that it is difficult to convey an adequate idea of the relative hardness or softness of the structures under observation.

The ovaries and tubes, in which important lesions may occur, are in some patients quite inaccessible to ordinary methods of examination. Pathologic lesions must often, then, be the subject of inference or speculation rather than capable of absolute demonstration. To add to the difficulty of study of symptoms, the mere thought of subjecting herself to examination is repugnant to the modesty of every woman, and the disease occurs in organs so sensitive that they can not be subjected to manipulation by a number of persons in succession. The patients who are willing to be brought before a class of students and subjected to repeated examination are exceedingly few, consequently many practitioners must enter upon their vocation with but little or no practical knowledge of the subject.

6. **Observation.**—The cultivation of habits of close observation is of the utmost importance. The observing physician will

often be able to determine with considerable accuracy the circumstances, condition, and diseased state of the patient from her conduct, manner, and general appearance. Thus, a woman with an abdominal enlargement who enters a physician's office with a face presenting the rosy hue of health, and appears well nourished, would be suspected of suffering from a physiologic rather than a diseased condition, and would be pronounced pregnant; while such an enlargement associated with a pale countenance, an emaciated face, thin cheeks, and sunken eyes would be regarded as indicating an ovarian growth. This special association of the features is known as *facies ovariana*, and is of value in forming the diagnosis. The conduct and deportment of the patient will frequently announce whether she is married or single; her manner of walking or sitting, the existence of a pelvic inflammation.

7. **Exercise of Judgment.**—While it is desirable to secure as much information as possible through direct observation, yet the physician should not permit himself to arrive at definite conclusions until accurate and thorough investigation secures all the data upon which his judgment must be formed.

8. **Value of Notes.**—The young physician should accustom himself to taking notes of his office cases; he thus forms the habit of more careful and systematic investigation of every case, accumulates data from which he is enabled to formulate more definitely judicious plans of treatment, and, probably most important of all, has the means of refreshing his mind from time to time as to the condition of any particular patient.

9. **History.**—Such a schedule should comprise the *name, residence, age, condition of patient, married or single, family history, personal history* (as previous sickness, duration of present illness, supposed cause, progress and symptoms).

Menses: first appearance, regularity, duration, what changes have since occurred; present habit, date of last menstruation; *pain*, whether it precedes, accompanies, or follows the periods, its character, severity, and where experienced.

Leukorrhea: amount of discharge, duration, continuance, color, consistence, and effect upon the parts with which it comes in contact.

Number of children or miscarriages: character of labor and convalescence and the influence upon subsequent health.

Coition: painful, sensation, frequency, methods employed to avoid conception.

Interrogation of other organs: regularity of alvine dejections, frequency of micturition, digestion; pain in head, in lumbar region, in groins, down the limbs, etc.

The inquiry need not, possibly should not, in all cases pursue the order here laid down. In some cases it will be better to permit the patient to tell her own story; in others it will be necessary to guide her course by an occasional judicious question, or to assume the position of questioner, and patiently endeavor to secure a complete history. While the appearance and the character of the symptoms may indicate a certain interpretation, the physician should reserve his judgment as to the condition until the testimony of subjective and objective symptoms has been completely secured, and then arrive at the diagnosis by their careful analysis.

DIAGNOSIS.

10. **Subjective Symptoms.**—The subjective symptoms are those which are elicited from the patient; and as we have already seen that the objective symptoms or physical signs are sometimes so difficult to determine, it becomes important to scan closely the information the patient can give.

11. **Causes of Error.**—Lisfranc * writes: "By their almost latent state, their great variety of symptoms (often very transitory), their sympathetic effects on all parts of the economy, and their immense influence on the nervous system, uterine diseases are peculiarly apt to lead medical practitioners into errors of diagnosis."

The reason for these errors is the difficulty in understanding their cause. The uterine symptoms are not always the most prominent, are slowly developed, and do not always attract the attention of the patient. Not infrequently is the physician consulted for disorder of the stomach, the heart, the liver; for vomiting, nausea, want of appetite, diarrhea; for neuralgia or hysteria; for a train of evils having their origin in poverty of the blood, as chlorosis, anemia, emaciation, and exhaustion—all of which may be symptomatic manifestations of an obscure uterine malady.

12. **Method of Procedure.**—The examination should proceed from general to local symptoms in such a manner as to bring the patient to the conviction, at which the physician has already arrived, that the only logical outcome is a physical examination.

13. **General Symptoms.**—There are many cases of disease in which the general or constitutional symptoms are very predominant, so much so, indeed, as wholly to obscure the diagnosis and

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* "Clinique Chirurgicale de la Pitie," vol. II, p. 182, Paris, 1842.

is loss of color in the skin, transparency of the tissues, local edema, frequent weak pulse, and general debility. These diseases of nutrition are accompanied not only by general debility, but also by progressive emaciation, until the disorder producing them has been properly treated. Under the influence of the diseased condition the patient becomes prematurely aged. The head is stooped, the limbs are bent, the features are drawn, and she presents a look of suffering; the flesh is soft and flabby; the countenance is expressionless, the complexion pale and faded, especially when leukorrhea has been long continued and profuse. The paleness is different from that of ordinary anemia; it causes the characteristic appearance that has been recognized under the name of *facies uterina* (Courty). Emaciation may not always be present; on the contrary, the patient may sometimes be corpulent, particularly when amenorrhea, rather than leukorrhea or hemorrhage, occurs. The obesity is sometimes so great as to lead the patient to believe herself pregnant, and not infrequently, while suffering severely, she is congratulated by her acquaintances upon her excellent appearance.

20. **Local Symptoms.**—The local symptoms are those sensations which are experienced in the genital organs or in those organs immediately associated with them. The latter are more particularly the rectum and bladder. Reflex phenomena from the rectum or bladder, or, on the contrary, sympathetic irritation of the uterus, when either of the former organs is the seat of disease, are very common, and the frequency of their occurrence can be appreciated when we remember that the nerve supply to the uterus, rectum, and vagina is derived through the cervico-uterine ganglia from the hypogastric plexus.

21. **Rectal Reflexes.**—It is not unusual to find that during menstruation women suffer from *diarrhea*. The pelvic vascular system is so general that engorgement or inflammation of the uterus will not fail to produce congestion in the other pelvic organs; and in any marked inflammation of the organ, associated with displacement, and particularly in retrodisplacements, the hemorrhoidal vessels will be found to be distended; thus, *hemorrhoids* in the female very frequently result from the presence of retrodisplacements of the uterus, and should never be subjected to operative treatment until the displacement has been corrected. In anteversion the cervix will frequently be found to project against the anterior wall of the rectum, and can be readily distinguished through this viscus. When the cervix is inflamed, the impingement of hard fecal matter against the organ not infrequently causes severe pain. In some cases this pain is experienced only during menstruation. The most frequent functional dis-

order of the rectum is constipation; partly from neglect, and partly from want of nerve irritation, the bowel becomes filled with fecal matter, the watery portions are absorbed, and hard, dense, scybalous masses form, which are evacuated with difficulty, and possibly only after repeated enemata. The muscular coat of the bowel becomes distended, with a loss of tone, resulting in a form of paralysis; fecal matter undergoes decomposition, is partly reabsorbed, and causes the condition which Barnes has denominated *copremia*, in which the skin is of a sallow, dirty hue, presenting ill-smelling secretions; the patient suffers from dyspepsia, flatulence, pyrosis—a condition akin to that known as uremia. The violent efforts at evacuation of the bowels lead not only to the formation of hemorrhoids, fissure, sometimes fistula, but they may, through the increased intra-abdominal pressure, cause displacement of the uterus and the vagina. When fissures exist, the pain during defecation is so great that the patient is likely to permit the bowels to go unevacuated rather than endure the resultant pain.

22. Vesical Reflexes.—The relation of the bladder to the uterus is still more intimate than that of the rectum, and consequently this organ is more likely to be affected in inflammatory conditions of the uterus. Retention of the urine may be produced by pregnancy or by pelvic growths, such as fibroid tumors or tumors of the ovaries. It sometimes occurs, also, as a result of irritation of the orifice of the vagina, a condition known as *vaginismus*. The pain may be so great as to produce a spasmodic contraction of the sphincter of the bladder. The most usual functional derangement of the bladder, however, is *frequent micturition*. It may occur as the result of reflex irritation from the pelvic organs, or in consequence of pressure from the uterus, produced by the presence of a tumor or by a pregnant uterus or a displaced organ in which either the fundus rests forward upon the bladder or is turned backward, causing the cervix to press against the latter. Either of these conditions may lead to functional derangement of the bladder, so marked as to cause the patient to suspect the existence of disease of that organ, or, as she will more probably say, disease of the kidneys.

23. Genital Symptoms.—The symptoms attributable to the genital organs are derangements in the performance of their functions. The particular symptoms are disturbances of menstruation (as, decreased, increased, or irregular menstrual flow), the existence of sterility, the presence of pain and excessive discharge; consequently, in determining the history of the patient, if she is married, we endeavor to elicit information regarding previous pregnancies and the character of the labors. *Sterility* in a woman who has been married for a number of years is an indication of some abnormal condition. It may be due to a malformation, to functional disturbances, or to actual disease. It should be remembered, however, that there are cases of relative sterility. The most unvarying function of the uterus is that of menstruation, consequently some disturbance in the performance of this function is one of the first indications of the existence of uterine disorder. *Amenorrhea* is a term used to signify absent or greatly decreased menstrual flow; in *menorrhagia* the flow, though regular, is increased and the menstrual period is lengthened. *Metrorrhagia* is a term used to designate a flow that does not correspond with the regular periods. *Dysmenorrhea* indicates the existence of pain occurring at the beginning of, during, or following the menses. These conditions will be considered more fully later.

24. **Hemorrhage** is by no means a constant symptom of uterine disease. Its significance varies according to the quantity and the time of life at which it occurs. During the earlier periods of menstrual life it is not uncommon for the menses to be very profuse, owing to defective development of the ovaries or to ovarian hyperemia. Occurring in women who have given birth to children, hemorrhage may be the result of inflammation of the mucous membrane of the uterus, producing hemorrhagic endometritis; or in women at a more mature age, it may result from villous degeneration of the endometrium (Goodell), a condition demanding careful investigation to discover or to exclude malignant disease. Hemorrhage is very commonly associated with fibroid growths of the submucous variety. *Uterine polypi*, whether due to a fibroid growth or to vascular growths upon the endometrium, are a very prolific cause near the climacteric; and hemorrhage occurring subsequent to it, should always awaken in the mind of the physician the possibility of malignant disease in either the mucous membrane of the cervix or the body of the uterus. Occurring during or following pregnancy, hemorrhage is probably due either to a threatened abortion or to retention of portions of the fetal envelopes. It should not be forgotten, however, that hemorrhage may occur from cystic disease of the ovaries, and in some cases in which the pelvic organs present no lesion, from valvular disease of the heart, Bright's disease of the kidneys, and obstruction of the portal circulation of the liver.

25. **Pain** is a very frequent symptom; it may be associated with the menstrual function, when it is known as dysmenorrhea, or may be independent of it. When it occurs during coition, it is known as *dyspareunia* (Barnes). It may be dependent upon, first, vaginismus; second, chronic nervous irritability due to

incomplete or awkwardly performed first coitus; third, inflammation; fourth, tumors; and fifth, malformations.

26. **Seats of Pain.**—Courty assigns six seats of pain, three of which are principal and three accessory. The principal seats are, first, the iliac regions; second, the loins; and, third, the hypogastrium.

27. **The iliac pain** is the more frequent; it is felt in the region of the iliac fossa, and extends from it to the hypogastric and lumbar regions, particularly toward the pelvic brim and cavity. This pain is most often felt upon the left side. It is probably due to tension of the broad ligament, and occurs upon the left side more frequently on account of the arrangement of the circulation through the veins. The left ovarian vein enters the left renal at a right angle, and passes behind the sigmoid flexure of the colon to reach it. The frequent impaction of this portion of the gut with feces would account for the obstructed circulation.

Courty ascribes pain in this region, however, to the inclination of the uterus to the right; hence any increase in size of the organ causes a gradual dragging upon the left broad ligament.

28. **Lumbar pain,** generally spoken of as backache, is felt in the lower part of the lumbar region, sometimes extending to the region of the kidneys, and, in others, and more frequently, down over the sacrum. In some cases the abdomen is encircled as with a belt of pain. This pain is usually ascribed to traction upon the uterosacral ligaments. It is doubtless due not infrequently to retention of secretion within the cavity of the uterus, by which that organ is obliged to go into labor in order to secure its expulsion. Its presence indicates disease of the cervix; when it is particularly marked in the sacrum, it is the probable result of retrodisplacement of the uterus.

29. **Lateral Pain.**—Pain felt upon either side of the uterus, recurring or intermittent in character, is frequently due to the effort upon the part of the inflamed Fallopian tube to propel the retained secretions into the uterus.

30. **Hypogastric pain** is experienced above the pubes, and, more than any other, seems to have its origin in the uterus. It is artificially elicited, rather than occurring spontaneously. Patients who do not experience it ordinarily, complain as soon as pressure is made over the lower portion of the abdomen. This pain is greatly aggravated in walking, so that the patient not infrequently experiences the necessity of support over the hypogastrium by means of a belt or by placing the hands in front, partly for support and partly for protection against injury.

31. **The accessory seats of pain** Courty ascribes first to the

anus or perineum; second, to the vagina or cervix; and, third, to the cavity of the pelvis.

32. **The anal or perineal pain** is usually produced by a retro-uterine tumor or retroflexed uterus. Patients with hypertrophy of the cervix not infrequently suffer pain in the anus and perineum while walking or riding, and often when sitting.

33. **Vaginal pain** is not so frequent. It is felt in women who have inflamed uteri, particularly during an orgasm.

34. **Pelvic pain** results usually from inflammation about the uterus or from inflammation of the tubes, fixation of the ovaries, or when organs have become cystic or the seat of pus collections.

35. **Leukorrhea.**—Leukorrhea, or whites, is a term given to discharges other than sanguineous that occur from the genital tract. To appreciate its significance as an indication of disease, we must recognize the character of the normal or physiologic secretion.

36. **The secretion from the Fallopian tubes and cavity of the uterus** is a thin, whitish alkaline fluid; that from the cervical glands is also alkaline, but is very viscid, tenacious, and transparent like white of egg.

37. **The secretion of the vagina and vulva** is whitish, made up of a serous fluid intermixed with scaly epithelium. The vulvar discharge also contains oil-globules from the sebaceous glands. The secretion of both vagina and vulva is acid.

The superfluous discharge from the cervix is coagulated by that of the vagina, forming a smeary material at the upper part of the vagina, and will be found to coat over the surface of a pessary. When the cervical fluid is in excess, it may pass from the vagina unaffected, perfectly transparent.

Another discharge or secretion is that which takes place from the vulvovaginal glands during coition or under excitement. This is a clear, viscid discharge. In very erotic women this discharge is ejected upon the approach of a person of the opposite sex, and nocturnal discharges occur in erotic dreams.

It is sometimes difficult to determine whether a discharge is the result of over stimulation of a physiologic secretion, or is produced by a pathologic condition.

38. **Catarrhal Discharge.**—A profuse discharge is not an infrequent result of exposure to cold. An increased secretion from the uterine glands occurs instead of the ordinary nasal flow. A hypersecretion which results from the hyperemia of the uterus in pregnancy may be considered physiologic.

In some undeveloped and strumous young women a leukorrhea occurs as a substitute for the menses. In many individuals a slight leukorrhea, preceding or following the menses, has no abnormal significance.

39. **Origin of Discharge.**—The source of origin of an abnormal discharge can be determined to some degree by its appearance and character. When the cavity of the uterus has produced it, the characteristics will be a thin, watery fluid, loaded with ciliated columnar epithelium, possibly containing also pus and blood-corpuscles, according to the extent of the disease.

40. **Discharge Simulating Abscess.**—It may be a continuous flow, but more frequently is intermittent, due to the swelling of the mucous membrane of the outlet, which leads to dilatation of the cavity and not infrequently of the orifices of the tubes. The uterus empties itself only by occasionally going into labor to evacuate its contents. Such a fluid, loaded with pus and blood-corpuscles, coming away in gushes, leads the patient to believe that an abscess has formed and been evacuated. Patients will not infrequently inform you that they have abscesses form and discharge at short intervals. The conditions described, however, may not be the only explanation. An accumulation in the tube, the uterine end of which is still patulous, may occasionally drain through the uterus. Such a condition has been denominated *hydrops tubæ profluens.*

41. **Other sources for purulent discharges** are found in the rupture of a tubal or peritoneal abscess into the vagina; the rupture of a suppurating ovarian tumor, of an extra-uterine pregnancy sac, or of an abscess about the vermiform appendix.

42. **Cervical Discharge.**—The discharge from the cervix is usually very viscid and tenacious; it may be clear or transparent, or clouded by desquamated epithelium and filled with pus-cells, when it is yellowish or greenish-yellow in color, or it may be mixed with blood-corpuscles.

The cervix will usually be dilated and patulous, its membrane thickened, abraded, and covered with papillæ.

43. **Vaginal Discharge.**—A thin, serous discharge flows from the vagina in simple inflammation; in more severe attacks it is loaded with epithelium, and the vagina is red and inflamed and has apparently shed its entire epithelial coat. When due to gonorrhea, the discharge is profuse, purulent, ichorous, irritating to the external parts, and attended with a burning sensation during micturition.

44. **Effect of Age upon the Discharge.**—The significance of the discharge is also dependent upon the age and physical condition of the patient. Prior to puberty it is usually due to irritation of the vulva, and is thin and serous, resembling that from eczema. After puberty, in the unmarried, it is generally

vaginal. In the more mature and in married women it is usually uterine.

As the individual approaches puberty the vulvar discharge becomes more oleaginous, from the development of the sebaceous follicles. Not infrequently, in uncleanly persons, the secretion from these glands is abundant, decomposes, and sets up an inflammation similar to the blennorrhea of the male. Near or following the climacteric a thin, watery flow, of a sweetish, sickening, or decayed-flesh-like odor, should be considered a strong premonition of cancer of the uterus.

45. **Physical Signs.**—The careful study and analysis of the subjective phenomena may afford an approximate idea of the disorder present, but the diagnosis should not be considered as completed until the objective symptoms, or physical signs, have been investigated.

46. **Senses Employed.**—In the study of the physical signs all the senses except that of taste are employed:

The sight, in inspection of the abdomen and external genitalia and in examining the internal organs by the use of the speculum.

The touch, in abdominal palpation and percussion, in simple vaginal or rectal touch, in conjoined manipulation, and in the use of sound or catheter.

The hearing, in percussion and auscultation.

The smell, in the examination of discharges.

47. **Examination.**—The physical signs are recognized through examination, which may be abdominal, pelvic, or a combination of the two in the bimanual or conjoined manipulation.

48. **Pelvic examination** comprises inspection, touch, and instrumental investigation.

49. **Abdominal examination** may be classified under inspection, palpation, percussion, auscultation, and exploratory puncture or incision.

50. **Preliminaries.**—The verbal examination of the patient should have been so conducted that upon its completion she will be impressed with the fact that a physical examination is the logical conclusion. This may be made upon a sofa or a common bed, as would be the custom when made at the home of the patient; but in office practice it will be found more convenient to have provided a suitable table or chair. The choice of table will depend upon the custom and convenience of the operator. One made by Codman & Shurtleff, of Boston, known as the Chadwick table, is very satisfactory. In the first examination or for the consideration of obscure conditions the clothing should be loosened and corsets removed, so that the abdominal walls can

be completely relaxed. The bladder and rectum should be empty. The latter suggestions are very important in order to permit the normal relations of the uterus and its adnexa to be determined. Fecal accumulations have been mistaken for ovarian and tubal enlargements or inflammatory exudates. A distended bladder has been mistaken for an ovarian tumor. The patient should be placed for examination so that the pelvis will be exposed to a good light.

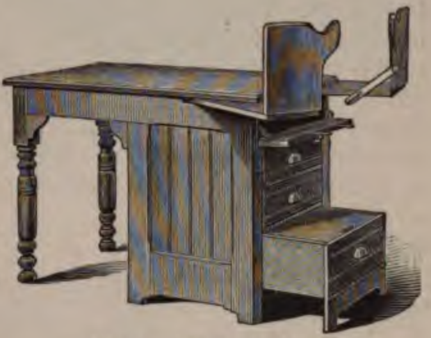
Fig. 1.—Chadwick Table.

51. Positions.—The patient may be placed in one of six positions for examination: viz., (1) dorsal; (2) lateral; (3) semiprone (Sims); (4) genupectoral; (5) Trendelenburg; (6) erect. Of the positions named, the dorsal and semiprone are the most important.

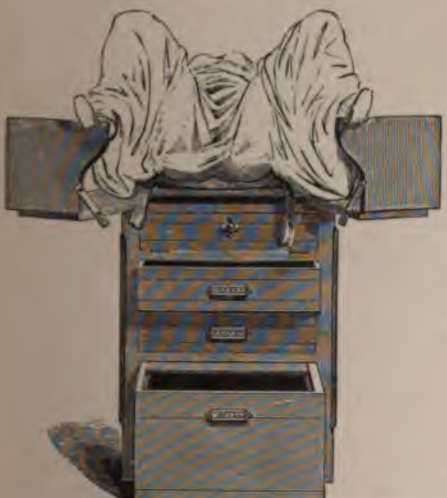
Fig. 2.—Dorsal Position.

52. The Dorsal Position.—The patient lies upon her back, with the limbs flexed and feet placed upon supports. The feet may be on a level with the buttocks or placed on supports a foot higher, which affords greater relaxation to the abdominal muscles. The clothing is lifted over the knees. The lower part of the body has been previously covered with a sheet, which is folded about the widely separated limbs, and permits the inspection of the vulva. This position permits the ready practice of the bimanual examination, and is the most favorable for vaginal and abdominal palpation and for the use of the valvular and Edebohls' specula.

53. The Lateral Position.—The patient lies upon the left side, with the limbs at a right angle to the body. This position was formerly much used by English gynecologists, and was preferred because it permitted examination to be made without danger of touching the tender structures at the anterior part of the vulva. This position was thought less vulgar, and it allowed the finger to follow more readily the curve of the sacrum and to reach with greater ease the highly situated cervix. Its chief advantage is in permitting more minute investigation of the lateral fornices of the vagina. By abdominal palpation it affords increased opportunity to recognize changes of position of tumors and displacements of the viscera, particularly of the kidney.

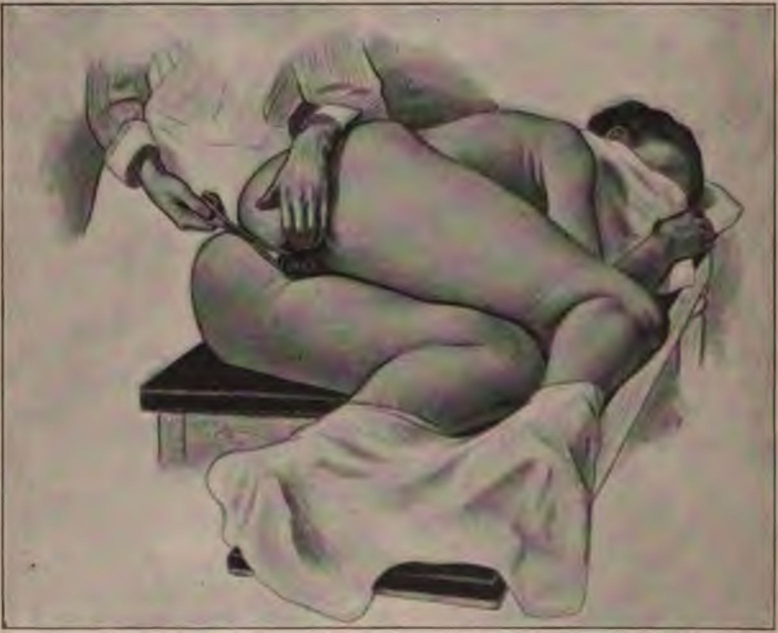

Fig. 3.—Sims' Position. Proper Method of Holding the Speculum.

54. The Semiprone or Sims' Position.—The patient is placed upon the left side and chest, with the left arm behind her, the left leg partly extended, the right flexed or at right angles to the body. The intra-abdominal pressure is neutralized. The mobility of the uterus is readily determined, replacement more easily accomplished, and some anteflexions recognized as the organ falls forward that are not apparent in any other position. The chief value of the position is in the use of the Sims speculum.

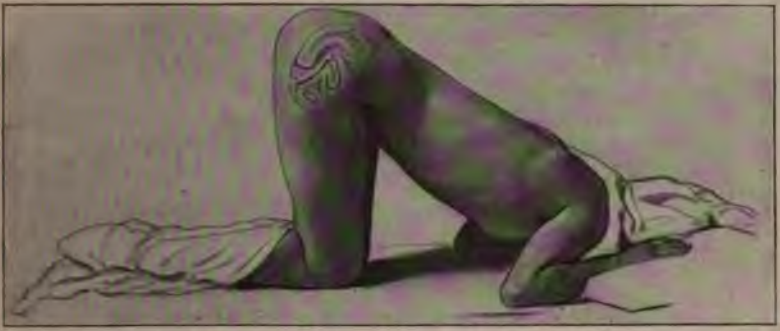

Fig. 4.—Genupectoral Position. Organs Shown in Outline.

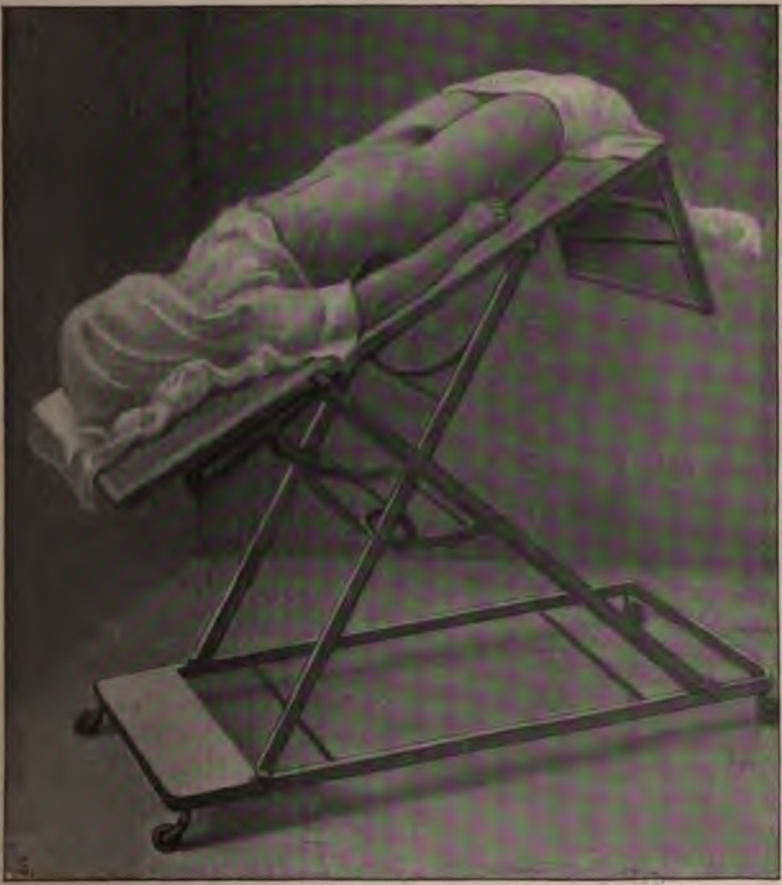

Fig. 5.—Trendelenburg Position.

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55. The genupectoral position, also called the knee-chest position, is one in which the patient rests upon the chest and knees. The left side of her face rests upon her left hand. The thighs are at right angles to the surface of the table. The chief value of this position is in replacing a retrodisplaced uterus or prolapsed ovary, or for elevating from the pelvis a more or less impacted tumor.

56. The Trendelenburg Position.—The patient lies upon her back upon a plane inclined at an angle of from 45 to 60 degrees, with the feet and legs over a flap of the table. This position can be utilized for examination of the pelvic viscera, but is of more service in some of the operations upon the pelvic contents; as the intestines fall away, the light enters directly into the pelvis.

57. The erect position is of limited application. The patient stands with feet separated, with one hand resting upon the shoulder of the physician, while he sits or kneels before her and introduces the index-finger into the vagina. The chief value of this position is in determining the amount of downward displacement of the pelvic contents and in securing ballottement in the early stages of pregnancy.

PELVIC EXAMINATION.

58. Inspection.—The patient is placed in the dorsal position. (Section 52.) In the first examination of every patient a visual examination should always precede the practice of touch. By carefully arranging the clothing this can be done without shocking the sensibility of the most modest. It affords information as to the cleanliness of the patient; the presence of pediculi; venereal warts or sores; congenital or acquired malformations; eruptions upon the vulva; tumors of the labia majora; elongation and thickening of the labia minora; hypertrophy of the clitoris; elongated or adherent prepuce; lacerations of the perineum; presence of hemorrhoids, ulcerations, or fissures; urethral caruncle; anomalies of the hymen; cystocele; rectocele; prolapse of the uterus; and the quantity and character of vaginal discharge. Inspection may be a simple preliminary to the touch.

59. Simple Touch.—The pelvic floor presents three apertures or perforations,—the urethra, vagina, and anus,—through any or all of which an exploration may be made. The vagina is the route usually chosen as affording the opportunity for securing the most extended information.

60. Preliminary.—The hands should be carefully cleansed.

Independent of any possible danger of conveying infection, the educated woman will be doubtful of the physician who proceeds to her examination with unclean hands and nails. The latter should be cut close. Either hand may be used. In some cases it may be desirable to use first one and then the other. When the vagina is sufficiently roomy, two fingers should be introduced, as affording additional length and surface for touch. The fingers should be lubricated with soap or some unguent, such as carbolized alboline. The soap is preferable, as in washing it is removed with the secretions; but with some patients it aggravates any existing irritation.

61. Procedure.—The physician with one hand separates the vulva in order not to carry up the hair, and proceeds to make the digital investigation. Pressing back the perineum, the finger or fingers more easily enter, and without impinging against the anterior delicate structures. The unemployed fingers of the hand should be carried back extended, as closing them shortens the distance accessible to touch. This procedure affords information as to cysts in the labia; the size of the vagina; relaxation of its walls; condition of its mucous membrane; amount of secretion; the contents and tenderness of the rectum; inflammation and projection of the urethra; tenderness, prolapse, and

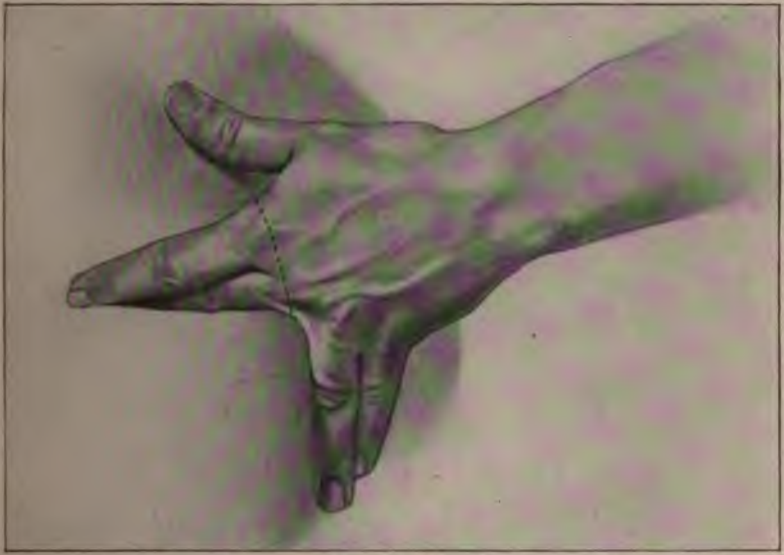

Fig. 6.—Proper Position of Fingers for Examination.

distention of the bladder; and relation of the uterus to the vaginal axis. In its normal position the cervix looks backward, the axis of the uterus being nearly at right angles to that of

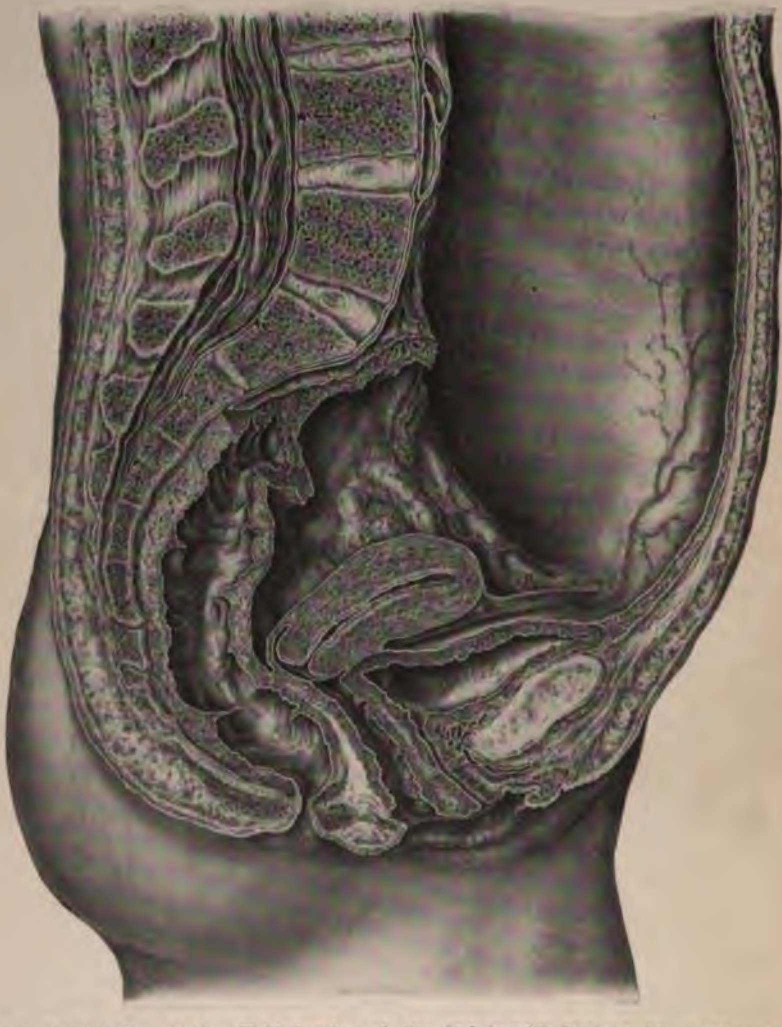

Fig. 7 (also Fig. 106).—Half Section of the Pelvis with Patient Erect, Showing Normal Position of the Uterus.—(*Deaver.*)

the vagina. The situation, size, and density of the cervix are recognized. It may be normal, may be lacerated on one or both sides, or may present a number of fissures—a stellate laceration. Its lips may be soft and velvety, from enlarged papillæ; nodular, from enlarged or cystic Nabothian glands; widely everted and dense, from chronic inflammation following laceration; enlarged and indurated, from chronic inflammation or malignant infiltration; enlarged, friable, or excavated in epithelioma. The os will be a slightly transverse depressed dimple when normal, or when abnormal, will be fissured laterally, bilaterally, through the anterior or posterior lip, or in a number of directions. It may be firmly closed or may stand open to such a degree as to admit the finger. The spaces about the vaginal projection of the uterus are known as the fornices. The posterior fornix is the deeper; the anterior is slight. The resistance and density recognized indicate the existence or absence of inflammation. A mass in the posterior fornix, if continuous with the cervix, the axis of which is parallel to that of the vagina, is a retroversion of the uterus. If there is an angle between it and the cervix, the condition may be a retroflexion of the uterus, a tumor of the posterior wall, an enlarged ovary or tube, or an inflammatory exudate. Digital examination also affords an idea of the mobility of the uterus, but the investigation is confined to the lower segment.

62. **Bimanual procedure,** also called the conjoined manipulation, or vagino-abdominal touch, affords more definite information. In every examination the introduction of the finger into the vagina should be associated with the application of the fingers of the other hand above the pubes upon the abdomen. The external hand may be placed about midway between the symphysis and umbilicus, pressing downward upon the anterior abdominal wall. It may be moved from one side to the other, in order to examine the contents of the pelvis. This procedure enables us to outline the size, shape, density, and situation of the uterus, and to determine the presence of growths in its walls and its relation to other pelvic growths or to inflammatory deposits. The normal tube is rarely palpable. When it is readily perceived, it is the result of an inflammatory condition. The ovaries are more easily recognized. To arrive at a definite conclusion in an obscure case, it is better to introduce into the vagina the fingers of the hand corresponding to the ovary to be palpated, as the extreme rotation necessary to bring the sensitive surface of the finger in contact with a small mass diminishes the sense of perception.

63. **Difficulties.**—The bimanual examination is rendered difficult by a large amount of fatty deposit in the abdominal wall and by rigidity of the abdominal muscles. The latter is sometimes so marked that the patient can not relax the muscles, and the deter-

mination of the pelvic condition is unsatisfactory. When this is due to nervousness, much can be accomplished by allaying the patient's fears and securing her coöperation. Have her breathe with the mouth open, fill her lungs, and then expel the air, while the hand over the abdomen depresses the wall with expiration, and thus secures an outline of the pelvic organs. The procedure may sometimes be rendered less difficult through diverting the patient's attention by making inquiries regarding other symptoms. When the resistance can not be overcome, or the sensitiveness arises from an inflammatory condition, or the abdominal walls are very fleshy, an anesthetic may be necessary.

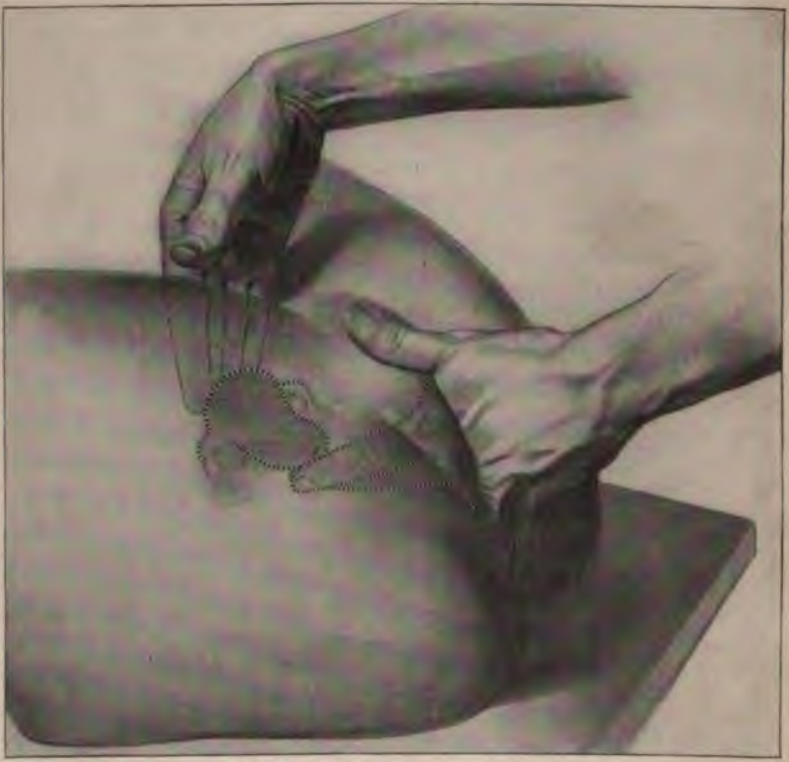
Fig. 8.—Bimanual Examination.

64. Virgins.—It is often a serious difficulty to determine when an examination should be made upon the young unmarried woman. It should be the rule to avoid such an examination, unless the symptoms are of such a character as to endanger her health. The nonappearance of the menses, associated with menstrual molimina, after the age when puberty is expected, must be considered an indication for a physical investigation. In many cases requiring digital examination touch may be made through the rectum.

65. Rectal Touch.—(The rectal touch, recto-abdominal, rectovagino-abdominal, or rectovesical touch.) The routine practice of digital examination by the rectum in the first investigation of a patient is to be commended. The finger should be carefully washed after removal from the vagina and before its introduction into the rectum, and vice versa. Neglect of this precaution may lead to a severe proctitis from the introduction of infectious material. The anointed finger, first directed forward, and after its entrance carried backward, is gently rotated. It enables us to recognize the condition of the rectum; the presence

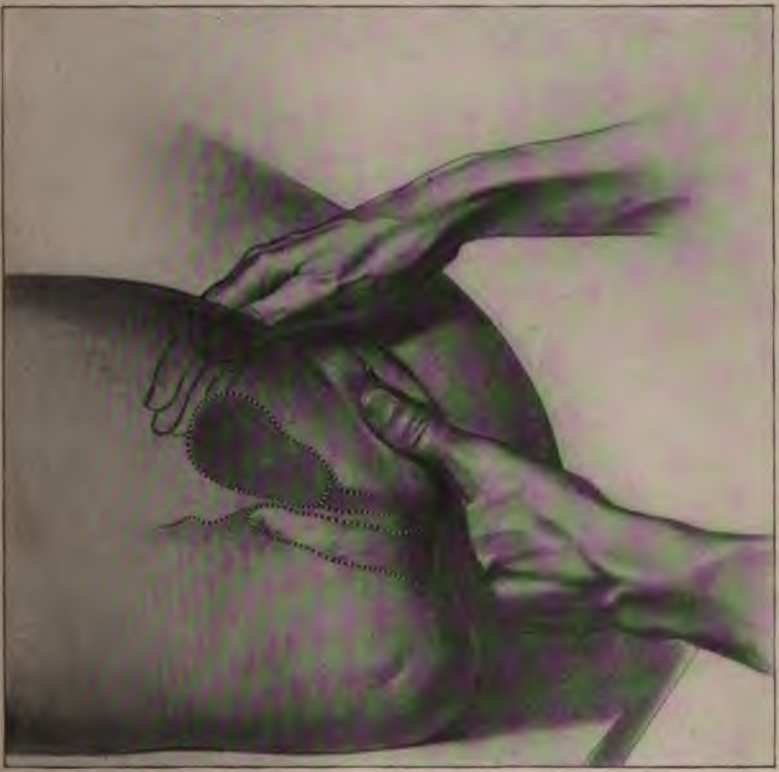

Fig. 9.—Recto-abdominal Palpation. M.

of fissures; hemorrhoids, ulcerations; contractions of the sphincter; sensitiveness of the coccyx; encroachment upon the bowel by the uterus; the condition of the posterior surface of that organ; the presence of inflammatory exudate in the pelvis; malignant infiltration of the broad ligaments or peritoneum; and the position of the uterus, when we desire to avoid a vaginal examination of the virgin. The rectal procedure promotes the replacement of the displaced organ. The correction of malpositions is facilitated by the introduction of the middle finger into the rectum and of the index-finger or thumb into the vagina. The conjoined rectal manipulation is known as the recto-abdominal, the rectovaginal, the rectovagino-abdominal, or the rectovesical, according to the position of the fingers of the two hands. The absence or presence of the uterus in congenital atresia vaginalis may be determined by rectovesical touch; that is, the

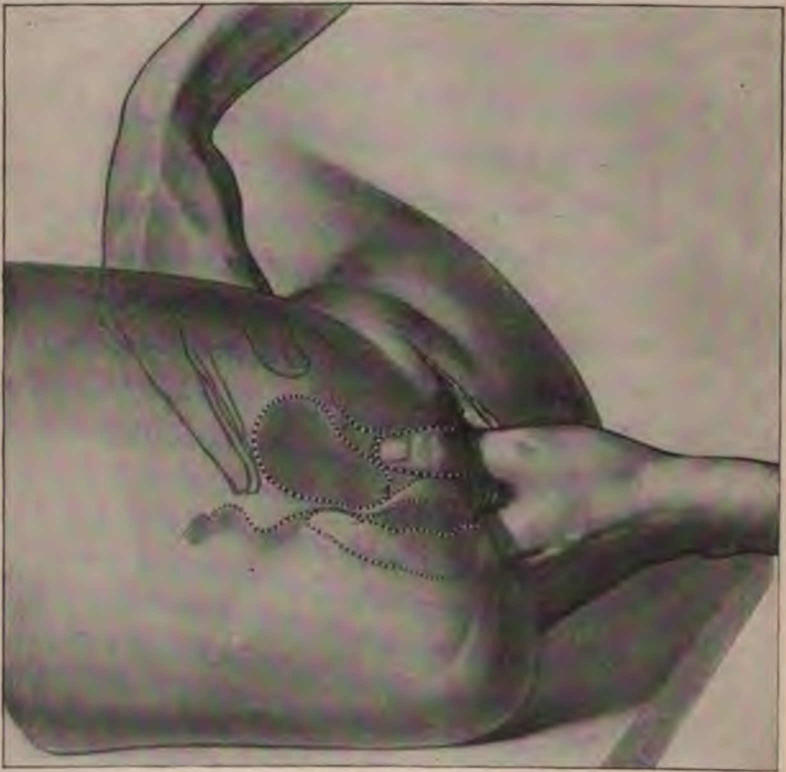

Fig. 10.—Rectovagino-abdominal Palpation.

introduction of the finger into the rectum and of the sound, bougie, catheter, or finger of the other hand through the urethra. It is rarely that it will be necessary to explore the bladder with the finger.

66. Simon's method consists in the introduction of the whole hand into the bowel, and is capable of affording additional light upon the condition of the pelvic organs. Such serious injuries have resulted from its practice, however, that it is now considered an unjustifiable procedure, unless the surgeon has an exceedingly small hand.

67. Precautions.—It would be unwise to dismiss the subject of bimanual examination without a word of caution. The procedure should always be exercised with care not to do injury. Anxiety to arrive at a correct diagnosis may lead to rupture of a tubal cyst or an ectopic gestation sac, and to the necessity for prompt operation to save life. I have seen two patients in whom examination has been followed by rupture of ectopic gestation sacs, and death in both cases from internal hemorrhage.

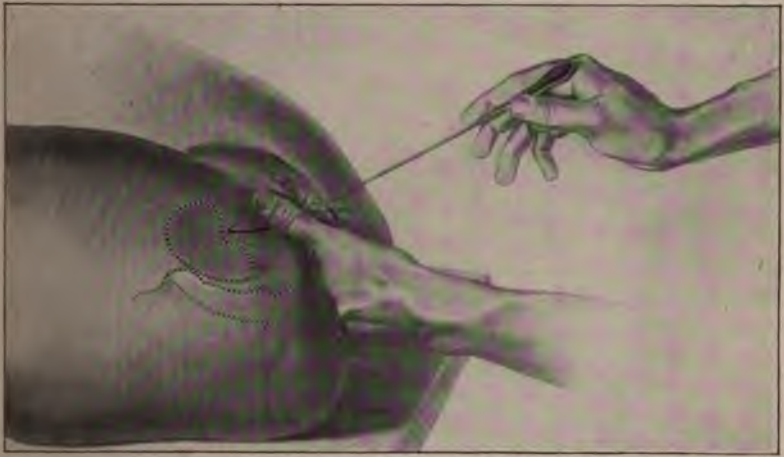

Fig. 11.—Rectovesical Palpation. Sound in Bladder.

68. Instrumental Examination.—The order generally recommended for the use of instruments has been: First, the use of the sound and then the speculum. The difficulty, however, in rendering the vagina sterile has justly led to the reverse procedure. The sound is a long, flexible instrument, twenty-five centimeters in length, two or three millimeters in diameter, terminating in a bulbous end, which generally has a slight elevation about six centimeters from its end, which indicates the normal length of the uterine cavity. For convenience in measurement its posterior surface is marked upon a scale of inches or centimeters. The instrument should be perfectly smooth, having no notches or indentations which may serve to retain infection. It is made of silver or copper (silver or nickel plated), and should be sufficiently flexible to admit of its being readily bent. The handle should be roughened upon one side so that the concavity of the instrument can always be determined. Such an instrument is known as Simpson's sound. Sims advocated the use of a finer and more flexible instrument, known as the probe.

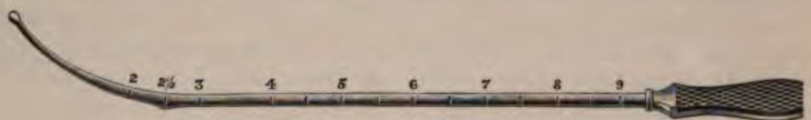

Fig. 12.—Simpson's Sound.

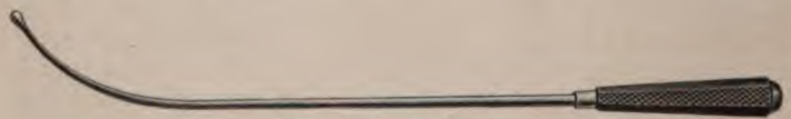

Fig. 13.—Sims' Probe.

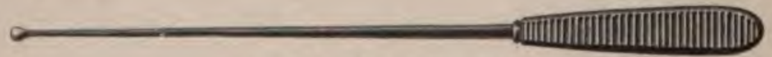

Fig. 14.—Whalebone Probe.

69. **Probes** may also be made of whalebone. The uses of the sound or probe are to ascertain the patency of the cervical canal, the depth of the uterus, its width or capacity, the thickness of its walls, the presence of intra-uterine tumors, the condition of the mucous membrane, the direction of the uterine canal, and the mobility of the uterus. In treatment it has been used to replace the displaced uterus. The experienced physician will be able to obtain much of this knowledge fully as

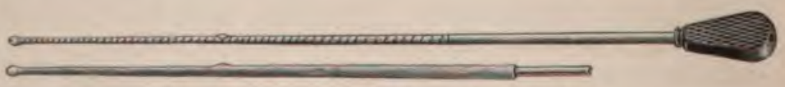

Fig. 15.—Spring Probe Covered with Rubber.

effectually by the bimanual examination, and in the majority of cases the disadvantages of the instrument greatly outweigh the value of the information secured by its use. It affords knowledge as to the patency of the canal which can not otherwise be secured; in all other instances the omission of its use is preferable to its practice. It is true it is capable of affording information as to the direction of the uterus when the situation of that organ is rendered doubtful by the presence of inflammatory exudate, but in such cases its use is contraindicated. Our inability to secure an aseptic vagina should lead to the introduction of the instrument through the speculum, and then only after the vault of the vagina has been carefully mopped with absorbent cotton wet with a solution of bichlorid, 1:2000, or, better, of formalin, 1:1000. It is almost impossible to introduce the instrument without injuring the mucous membrane of the uterine cavity, an injury which may afford a favorable culture-fluid for the development of germs which may be found in the vagina, or, exceptionally, even in the

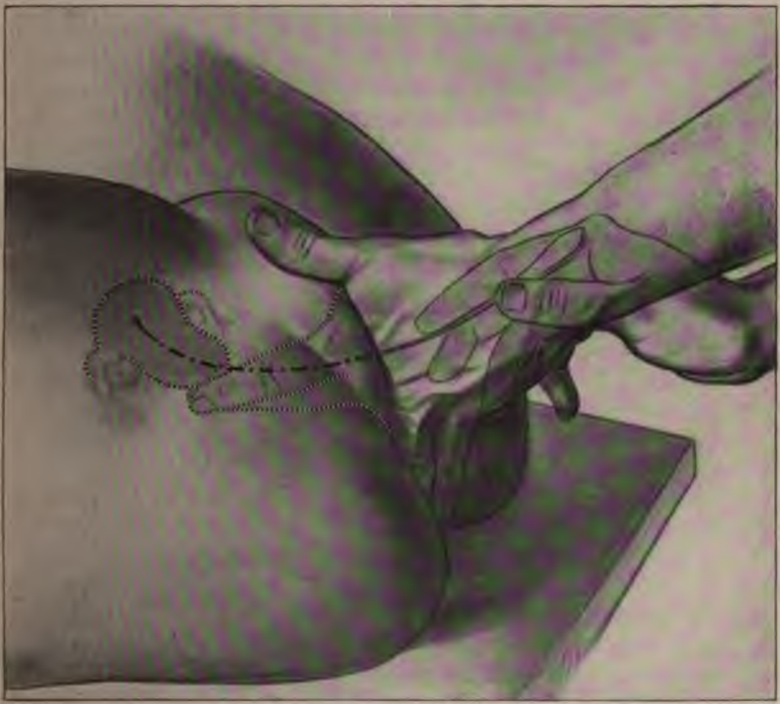

Fig. 16.—Introduction of the Sound.

cervical canal. Such injuries explain the inflammatory irritation following its use, and still further demonstrate the wisdom of discontinuing its employment for replacement of the uterus. When it seems desirable to use the sound without the speculum, the vagina should previously be scrubbed and two fingers introduced into the cervix, by which the sound is guided into the os. No force should be used and the instrument should have such a curve as will permit it to pass readily in the direction which our bimanual examination has demonstrated should be that of the uterine cavity.

70. **Precautions.**—The date of the last menstruation must be known and the use of the instrument should be avoided when there is the slightest suspicion of pregnancy. It should not be employed in the presence of acute inflammation or when inflammatory exudate or old infiltrations can be determined. Its employment in a case of malignant disease may lead to dangerous hemorrhage. In the uterus softened and rendered friable by inflammation the sound may penetrate its wall and enter the abdominal cavity. This accident produces no inconvenience unless the instrument carries infection. The sound may also pass into a Fallopian tube. This is more likely to occur in a bicornate uterus. The instrument should be scrupulously clean and should be removed from a five per cent. solution of carbolic acid for use. After its use in a case of suspicious character it should be sterilized by heat.

71. **Speculum.**—The patient in the dorsal position, with the limbs separated, reveals the mons veneris, with the larger labia. The latter are separated by a cleft or slit—the rima pudenda. Frequently the labia minora are elongated, and they, with the clitoris, are prominent. The posterior commissure may have been injured, and, instead of a slit, we will have a triangular opening, through the posterior part of which projects the vaginal wall. In lacerations of the pelvic floor the posterior segment may be drawn back, permitting one or two inches of the vagina to be inspected. By hooking back the vagina with two fingers the cervix may frequently be seen. The necessity for satisfactory inspection of the uterus led to the invention of the speculum. A great variety of instruments for this purpose has been devised, but all may be classed in three divisions: the tubular, the multivalvular, and the univalve.

72. **The tubular speculum**, known as the Ferguson speculum, may be made of glass, wood, rubber, celluloid, or metal. The instrument is cylindric, the external end with a flange, the internal beveled, and having one long side. Glass instruments may be made of milk-glass, as the German speculum, or covered

with quicksilver, and over this a coating of pitch, rubber, or celluloid. Such specula can not be sterilized by heat; glass is brittle, easily broken, and is subsequently useless. They are very serviceable in making applications to the cervix, but only the wooden instruments are utilizable for the use of the actual cautery. The application of medicaments to the uterine canal, or the use through it of the sound, are to be condemned. The speculum is not self-retainable. Its range of application is so limited that it is now infrequently used. To introduce this instrument the physician separates the labia with the left hand and holds the speculum with the right thumb and middle finger on either side and the index-finger upon its upper surface. The longer side is placed against the posterior commissure of the vulva, which is depressed, and the speculum is pushed upward and backward, at the same time rotating the instrument so that its shorter side does not impinge against the tender anterior structures. The situation of the cervix has been previously located by the touch. If the cervix is not brought at once into the field of the speculum, it can usually be exposed by rotating the instrument. When this procedure fails, it may be drawn into the field by a tenaculum. If the cervix is large, only a part of it can be exposed at one time, and consequently a distorted idea of the condition is frequently obtained.

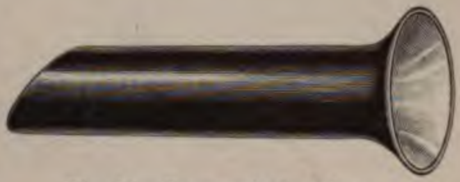
Fig. 17.—Ferguson's Speculum.

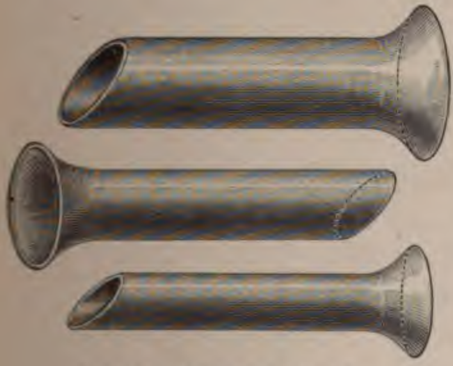
Fig. 18.—Milk-glass Specula.

73. **Valvular Specula.**—The valvular specula afford a much better exposure, and as they are self-retaining, they have largely supplanted the tubular. The quadrivalve instrument is now but little used, as it affords but slight additional advantage over the bivalve and is difficult to keep clean. The Nott and Nelson specula have three blades and afford an opportunity to inspect the anterior vaginal wall. The bivalve speculum is the most

satisfactory for general use. Of the great variety of specula, Higbee's (three sizes), Talley's, and Goodell's are probably the most satisfactory. The blade should be from 7.5 to 11 centimeters in length. When the vaginal portion of the cervix is short, the Higbee speculum, which has a long posterior blade, will not expose the os. In such cases the Goodell or Talley specula, with blades of equal length, are better. The speculum is introduced by separating the vulva with the fingers of the left hand, while the speculum, held in the right, is introduced with its transverse diameter parallel to the long diameter of the vulva. As the widest diameter of the vagina is at right angles to that of the vulva, the instrument is rotated and carried upward, directing the blades behind the cervix, the position of which has been previously determined by the digital examination. As the blades

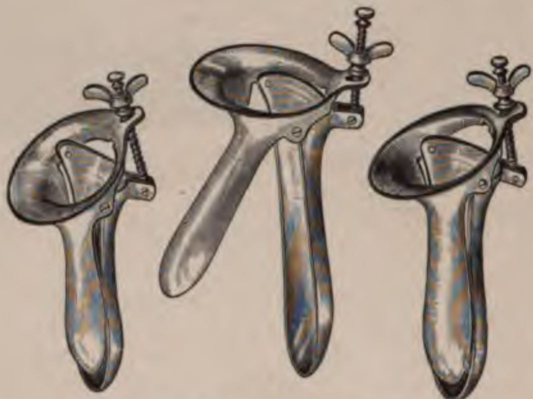

Fig. 19.—Higbee's Specula (three sizes).

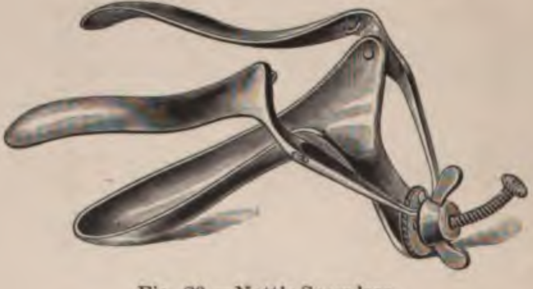

Fig. 20.—Nott's Speculum.

are separated the cervix is generally exposed. In marked anteversion it may be necessary to use a tenaculum to bring the cervix into view. The speculum is a therapeutic instrument, although it confirms the diagnosis which has been made by digital examination.

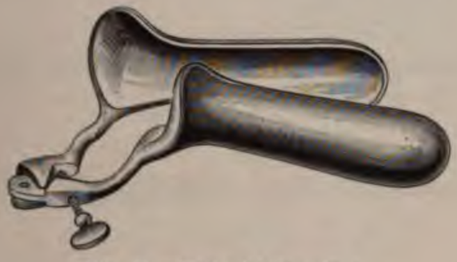

Fig. 21.—Talley's Speculum.

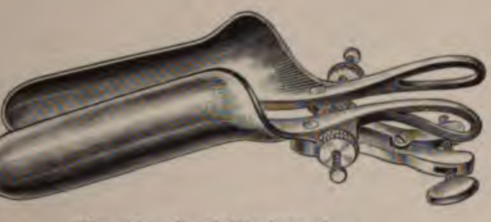

Fig. 22.—Goodell's Speculum.

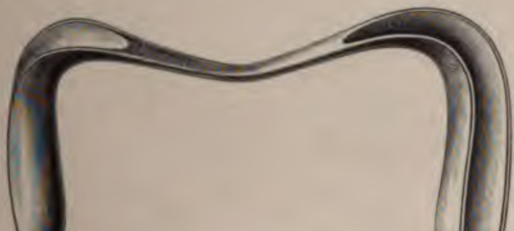

Fig. 23.—Sims' Speculum.

74. The univalve or duck-bill speculum, introduced by Sims, is used with the patient in the semiprone position. The instrument has two blades at either end of a handle, which are about 10 centimeters long, the smaller blade being 1.5 centimeters and the large blade 4 centimeters in width. To introduce this instrument the physician raises the buttock, passes the blade with its width parallel to the vulva, and after its entrance rotates it with the handle directed backward. The assistant then holds the other blade with the right hand, using the instrument as a retractor. His elbow is held against his hip, while the left arm rests upon the patient, the hand elevating the buttock. Care must be exercised to follow the curve of the sacrum or the instrument will slip out. As the perineum is drawn back the vagina is ballooned by the atmospheric pressure

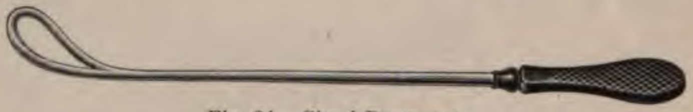

Fig. 24.—Sims' Depressor.

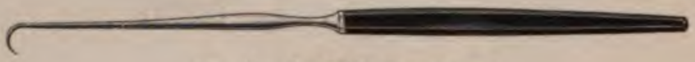

Fig. 25.—Goodell's Tenaculum.

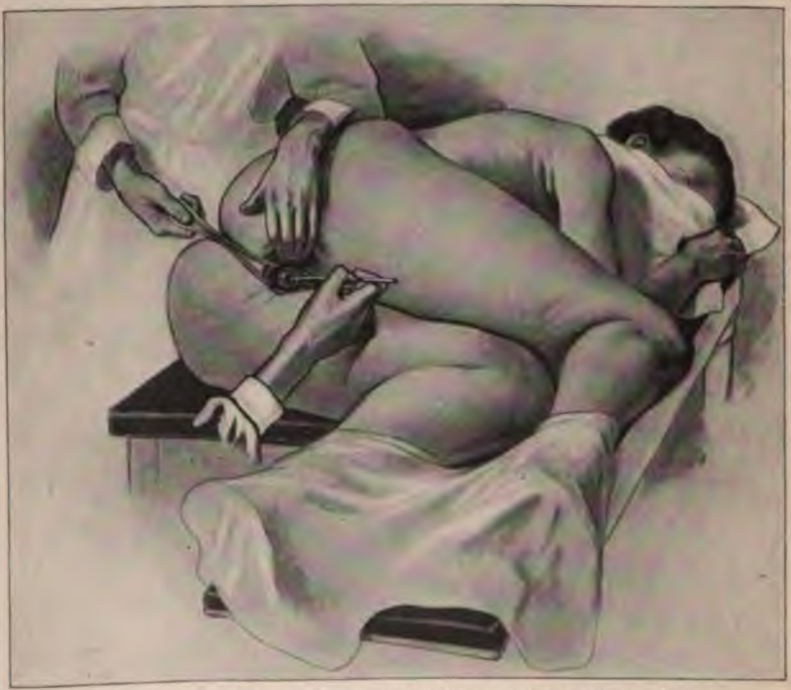

Fig. 26.—The Uterus Drawn into View with the Tenaculum.

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and the cervix and upper vagina are exposed. When the vagina is large, with relaxed walls, the cervix may be obscured from view. The depressor pushing back the anterior wall or a tenaculum hooked into the cervix will overcome the difficulty. The univalve speculum affords a better exposure of the cervix and upper portion of the vagina than any other form of instrument. Its particular disadvantage is that it is not self-retaining, and in office practice requires the assistance of a nurse. Various devices have been instituted to render it self-retaining, but they require considerable time for their use. In operating with the patient in the semiprone position, the irrigating fluid and blood run forward, between the patient's limbs, rendering it difficult to keep her person and clothing clean. The Sims speculum can be used with the patient in the lithotomy position, but is uncomfortable

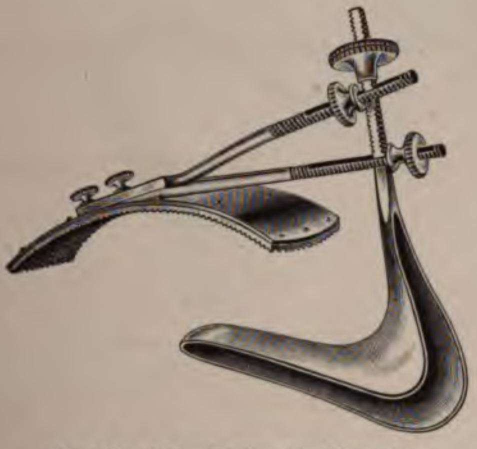

Fig. 27.—Self-retaining Sims Speculum.

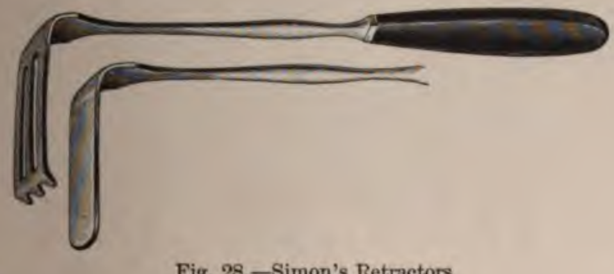

Fig. 28.—Simon's Retractors.

to hold. The Simon posterior and side retractors serve a similar purpose. The perineal retractor known as the Edebohls speculum is the most satisfactory, as with the patient upon the back, with the limbs acutely flexed, the perineum is retracted and held back by the weight attached to the instrument. The cervix and the upper and anterior vagina are thus exposed to manipulation.

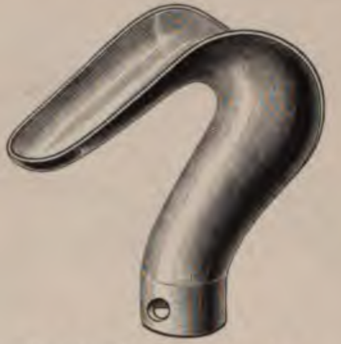

Fig. 29.—Edebohls' Speculum.

75. Uterine Fixation and Downward Traction.—Reference has already been made to the use of the tenaculum to bring the cervix into the field of the speculum. The same instrument, or, better, a double tenaculum known as bullet-forceps, guided to the cervix by the finger, may be used to fix the organ, or in some

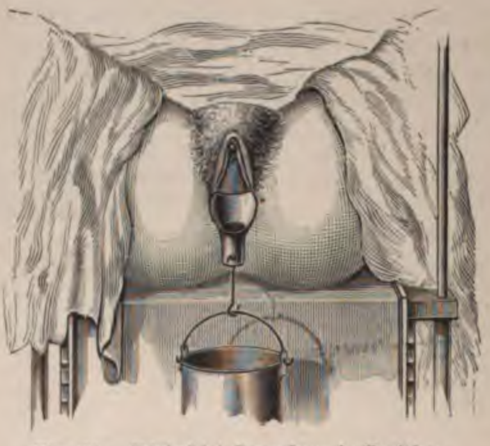

Fig. 30.—Edebohls' Speculum in Position.

cases to exert traction upon it during digital examination. Such a procedure enables us to examine through the rectum the whole posterior surface of the uterus and even to pass the finger over its fundus. It is utilized in replacing the retroverted and retroflexed organ and in differential diagnosis of abdominal and pelvic growths.

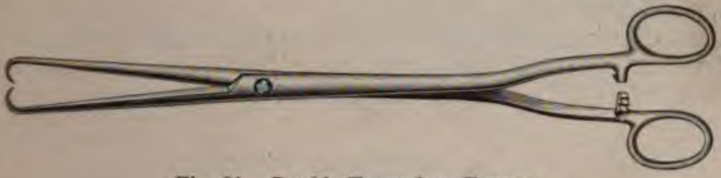

Fig. 31.—Double Tenaculum Forceps.

76. Dilatation of the Uterus.—It is frequently necessary to explore the cavity of the uterus, either to complete the diagnosis of the condition rendered probable by other procedures or as a preliminary to an operation. The method of operation may be divided into two classes: (1) bloodless—tents, divulsion, and gradual dilatation; (2) by incision of the external os and bilateral incision of the cervix. In the practice of any of these procedures the presence of inflammation in the organ or vestiges of inflammatory exudate about it should be excluded. The

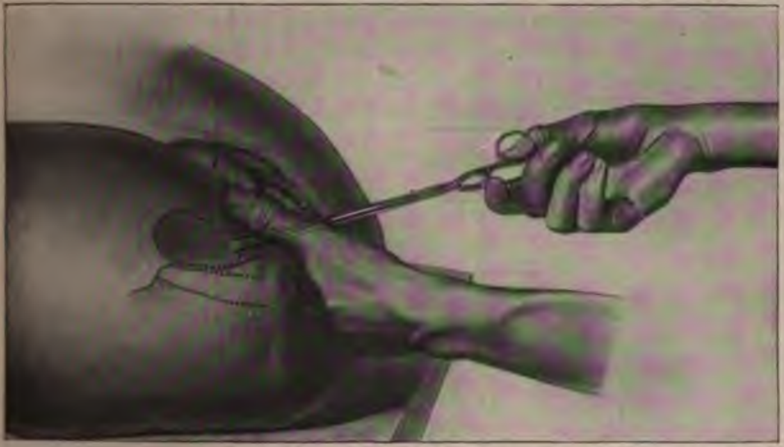

Fig. 32.—Traction upon Uterus with Double Tenaculum during Digital Examination by the Rectum.

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existence of such conditions presents an element of serious danger.

77. Dilatation by Tents.—The use of tents was formerly a very popular and a general method of dilatation. The materials used for this purpose were sponge, laminaria, tupelo, slippery elm, decalcified ivory, and gentian root. The sponge has the greatest dilating power, but is the most difficult to render aseptic and to maintain in that condition. The frequent unfortunate sequels to their use have largely led to their discontinuance. The laminaria and tupelo tents are the most used. The former may be introduced in nests. Their dilating power is enhanced by having them hollow. A number of small ones to fill up the canal is to be preferred to one large tent. They may be rendered aseptic by subjection to a dry heat of 250° F. The tent should be placed in an envelope before its introduction into the sterilizer, and the envelope should be broken only when it is to be used. The tents may also be rendered safe by immersion prior to their use in a saturated solution of iodoform in ether. The vagina and cervix should be carefully cleansed with an antiseptic solution; the cervix is seized through the speculum with bullet-forceps, while the tents are held in dressing forceps, and introduced, one after another, until the canal is filled. Care must be exercised to mold the tents to the curve of the canal, and no force should be employed in their introduction. The tents should project from the external os, and should be held in place by a tampon of iodoform gauze. They should be removed at the end of ten or twelve hours. They are removed by pulling upon a string fastened at the end of the tent. Removal is sometimes rendered difficult by irregular dilatation; the

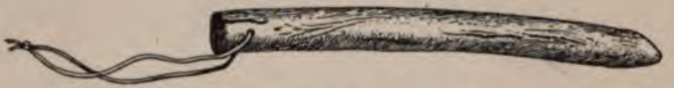


Fig. 33.—Hollow Laminaria Tent.

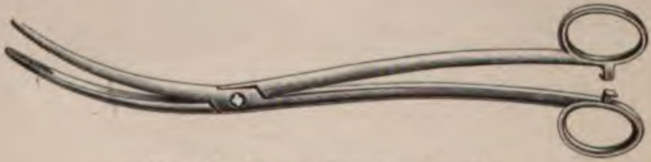


Fig. 34.—Uterine Forceps—Dressing.

internal os, being more resistant, causes an hour-glass-shaped distention. The tent is removed by placing the finger against the cervix during traction. The irregular dilatation is less likely to occur with a tupelo tent, though its dilating power is not so great. Should the patient complain of pain during the dilatation, it may be relieved by from two to five grains of acetanilid or from ¼ to ½ of a grain of codein. The removal of the tent should be followed by careful antiseptic irrigation, when another tent or series of tents may be introduced. The use of the tent affords an opportunity to make a digital exploration of the uterine cavity, and is of advantage in small submucous fibroids, in suspected epithelioma, and in retained products after abortion.

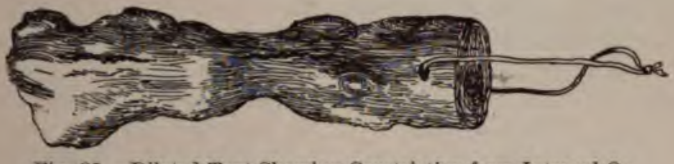


Fig. 35.—Dilated Tent Showing Constriction from Internal Os.

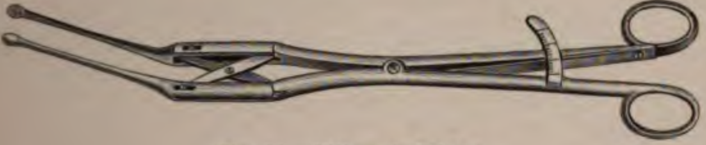


Fig. 36.—Ellinger's Dilator.

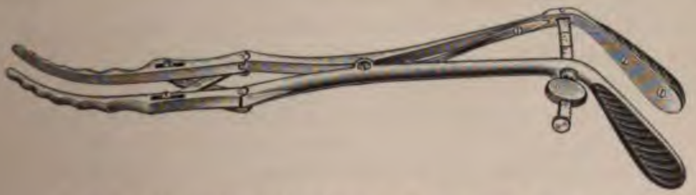


Fig. 37.—Goodell's Modification of Ellinger's Dilator.

78. **Divulsion** consists in the rapid dilatation of the uterine canal by the various dilating instruments. The preferable instruments are the parallel bar dilators, as the Ellinger, with the Baer and Goodell modifications; the latter, with its roughened blades, is a powerful instrument. The vagina and cervical canal

are carefully cleansed, and through the speculum the cervix is seized with double tenaculum and stretched with small dilators, and subsequently with the large instrument to the extent of two or three centimeters, if desired. The principal objection to the procedure is that the pressure is confined to the lateral surfaces of the cervix and may lead to laceration.

79. **Gradual dilatation** is accomplished by the use of graduated bougies, of steel or hard rubber. The latter are preferable, as they can be sterilized by heat. The Pratt series of bougies, which have two bougies to each handle, making eighteen in the set, the maximum being No. 43, will be useful. Each bougie is two millimeters larger than the preceding. After thorough cleansing of the vagina and cervix the Edebohls speculum is introduced, the cervix is seized with vulsellum or double tenaculum, and the bougies are used one after another, to the largest size. Care should be exercised not to puncture the uterine wall. This accident is more likely to occur in acute flexions; the point of the instrument makes so much pressure upon the thin convex wall near the flexion that it finally ruptures. It is sometimes advised to precede this method by the use of a tent, but it does not seem necessary. The dilatation can be accomplished by this procedure in shorter time than by divulsion.

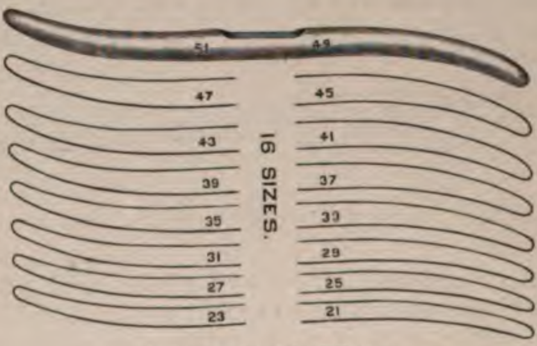


Fig. 38.—Pratt's Dilators.

80. **Incision of the Cervix.**—The external os, when very rigid, or when the cervical canal is partly dilated by an extruding fibroid, may be incised. This procedure may be resorted to for abortion in the absence of proper dilating instruments. An incision from 1 centimeter to 1.5 centimeters should be made with scissors upon either side. As the ordinary scissors slip off, Kuchenmeister's scissors are more effective. The procedure is

most readily accomplished by grasping each lip with a double tenaculum and incising on either side with a knife. The operation completed, the incised cervix should be closed with sutures.

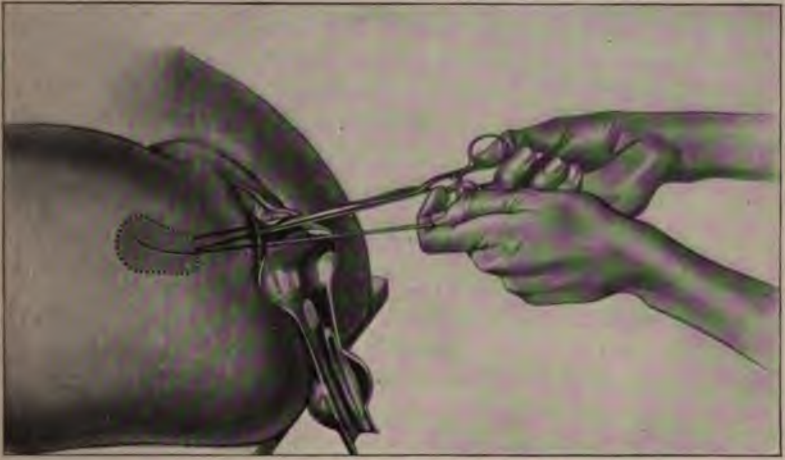


Fig. 39.—Introduction of Dilator into Uterus.

81. Complete bilateral incision of the cervix is rarely indicated, as other measures of less severity can be utilized. The operation may be supplemented, if necessary, by ligation of the uterine arteries. The vessels may be secured by drawing the cervix to one side and passing a ligature with a strongly curved needle. Care should be exercised to keep close to the uterus and not to carry the ligature forward of a line tangent to the anterior circumference of the cervix, in order to avoid ligation of the ureter. A second ligature is passed upon the opposite side, when the cervix can be incised with a knife to the vaginal fornix on either side without danger of hemorrhage. Although generally

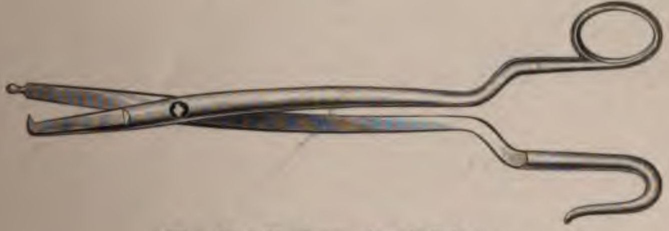


Fig. 40.—Kuchenmeister's Scissors.

advised that ligation should precede incision, it is unnecessary. Hemorrhage does not always occur, and when it does, the bleeding vessels can be seized with forceps and then ligated. If the finger can not be passed through the internal os, the canal can be still further enlarged with a probe-pointed bistoury. After exploration or operative procedure the cervix should be carefully sutured. The lateral sutures should be removed in two or three hours, or in a shorter time if there is any reason to fear that the ureter has been ligated. A prolonged retention of the ligatures as introduced prior to the incision would result in sloughing of the vagina.

82. **Dilatation by Gauze Packing.**—Vulliet has devised a procedure for prolonged dilatation, which he denominates a "method of dilatation by progressive plugging." It consists in repeated plugging of the cervix with medicated gauze. Strips of gauze, after the uterus has been carefully cleansed, are packed into the cervical canal until the uterus is filled. They are permitted to remain for forty-eight hours, when they are removed, and if the uterus is not then dilated sufficiently to admit the finger, the cavity is again cleansed and packed. Pieces of compressed sponge have been used for a similar purpose, and, from their increase in size under moisture, are probably more effective. The only source of anxiety is the uncertainty as to their being absolutely sterile. This plan of procedure may be carried over a series of days or weeks, without inflammatory reaction. It is, however, not effective in cases of rigid cervix, and the same purposes may be accomplished by a more rapid dilatation.

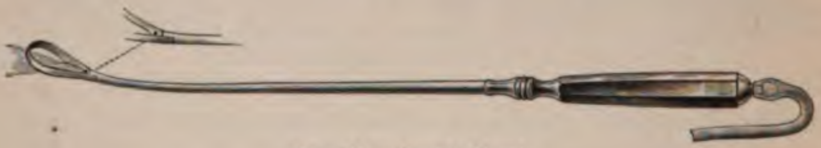


Fig. 41.—Douche Curet.

83. **Cureting** in doubtful cases may afford sufficient material for a miscroscopic examination to make the diagnosis certain.

84. **Microscopic Examination.**—The most careful examination by touch and sight will often fail to reveal minute tissue changes, which are of such ultimate importance as to render their prompt discovery vital to the interests of the affected individual. The microscope in such conditions is a valuable diagnostic agent. To its use we are indebted for our knowledge of the normal structures of the genital tract. It has revealed the character and variety of the epithelium, its situation and relation to the glandular

structure—information which could not be otherwise procured. It is, therefore, reasonable to consider that it would be equally valuable in demonstrating pathologic alterations in the course and progress of disease as impressed upon the tissues, and consequently prove a valuable means of diagnosis, upon which can be based definite ideas of prognosis and suitable methods of treatment.

85. **Microscope.**—The microscope can confirm the suspicion of a disease awakened by subjective symptoms and the macroscopic appearances; reveal the extent, stage, and progress of the disease; or demonstrate the error occasioned by misleading symptoms and unusual physical signs. While the microscope in association with bacteriologic cultures will prove of value in confirming the diagnosis in gonorrhea and sepsis, and in discovering the causes or sources of irritation in various inflammations of the genital tract and peritoneum, its greatest value will be found in the differential diagnosis between benign and malignant alterations. Upon the determination of a certain diagnosis, of course, depends the prognosis and the method of treatment. When we consider the rapid changes that take place in malignant disease, the extension along the course of lymph-channels to lymph-glands, and the involvement of tissues which are inaccessible, we can appreciate the importance of any means which affords early knowledge of the serious character of the disease. The method of determining the diagnosis by watching the course of the disease can not be too strongly condemned. Not infrequently such assured recognition of the disease is associated with the knowledge that the time for successful operative treatment has elapsed.

86. **Material.**—The material upon the investigation of which the diagnosis is based may be procured by excision when the parts are accessible, or, when the affected tissue is within the uterus, by the use of the curet. Occasionally, portions may be broken off by the finger or masses may be spontaneously discharged.

87. **Methods.**—The technic of hardening, section cutting, coloring, and mounting of specimens is better considered in special works. As time is, however, an element for consideration in the diagnosis of an individual case, cuttings for examination may be made from fresh tissue which is frozen. In tissue cureted that affords no pieces sufficiently large for section it may be pulled apart before examination. This method is often sufficient to permit the recognition of important tissue changes, such as sarcoma, in which the pathologic alterations are mainly in the connective-tissue elements. An excellent example is afforded in the small round-celled sarcoma, in which the elements resemble those of

the lymphatic tissue. The method of tearing is not, however, without the possibility of error. The sarcomatous cell can not be differentiated from the decidua cell. The decidual tissue in mass can, of course, be readily recognized. Likewise the cylindric epithelial cell of malignant adenoma can be mistaken for the developing epithelial elements of the more simple glandular endometritis. It is self-evident that the tearing method can not be accepted as an absolutely reliable procedure for diagnosis. Sections for examination afford the most accurate information when cut in longitudinal or transverse directions. An oblique section reveals in some respects the valuable features of both the former. A section cut parallel to the surface is of but little value; the glands are revealed, but the appearance of the epithelial lining is ambiguous. Its cylindric character can not be recognized.

88. Failure.—Examination may fail to reveal the true character or presence of disease, because the section is made through the adjoining healthy tissue.

89. Exploration of the Urethra, Bladder, and Ureters.—A digital exploration of the bladder is rarely required. Frequent and painful micturition may require a urethral or vesical investigation. Inflammation of the urethra may be recognized by tenderness and thickening of the canal as revealed by touch of the anterior vaginal wall. The urethra can be felt as a cord-like projection beneath the pubes. The condition of the urethral mucous membrane can be determined by the use of Skene's urethral endoscope. Points of inflammatory redness, desquamated epithelium, fissures, and thickened membrane are thus recognized. It is important that the instrument should not be very large, otherwise the pressure obscures the pathologic alterations. Dilatation of the urethra by bougies will permit the exploration of the bladder by the introduction of a test-tube and the use of a small mirror passed into the tube at such an angle as to afford a view of a large part of the surface. The urethral specula devised by Kelly are more satisfactory, as they afford an opportunity to evacuate the bladder and give a view of its entire internal surface. The urethra is dilated by bougies to a size which will admit the speculum desired, which is introduced upon an obturator. With a good light the condition of the mucous membrane can be recognized and suitable medication

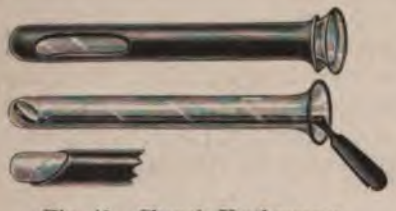


Fig. 42.—Skene's Urethroscope.

applied. The orifice of each ureter can be exposed and catheterized, thus facilitating the determination of the relative condition of the two kidneys. The catheter can be passed without the speculum, but the danger of introducing infectious material from the urethra or bladder is too great to render it an advisable procedure. Kelly has recently devised a long ureteral catheter of soft material, which can be introduced to the pelvis of the kidney. It affords certain knowledge of the condition of the two organs as determined by their secretion. This knowledge may be of infinite value when we have determined that one kidney has been destroyed. Its use also discloses the existence of a stricture or obliteration of a ureter.

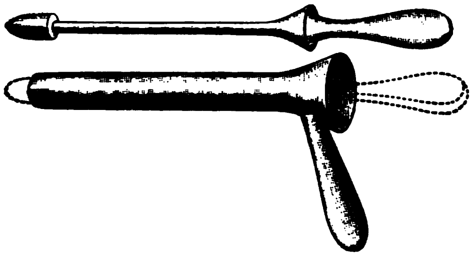
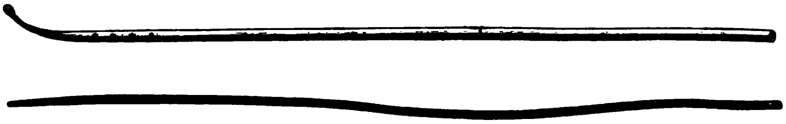


Fig. 43.—Kelly's Specula (Urethra).



Figs. 44 and 45.—Ureteral Catheters. Metal and Soft.

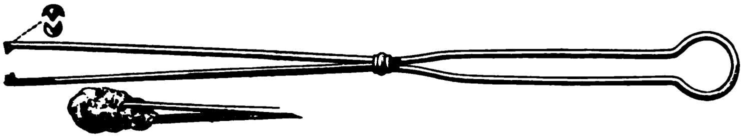


Fig. 46.—Mouse-tooth Forceps for Cotton Pledgets.

Harris has recently invented a *double catheter*, the ends of which are separated after its introduction into the bladder, and a sulcus is formed, in which the urine of each kidney may accumulate, by pushing up the posterior wall of the bladder by a blunt staff from the vagina. This staff is attached to the external portion of the apparatus by which it is held in position. This apparatus permits the urine to be obtained from the kidneys separately and at a less expenditure of skill than is required for the separate catheterization of ureters.

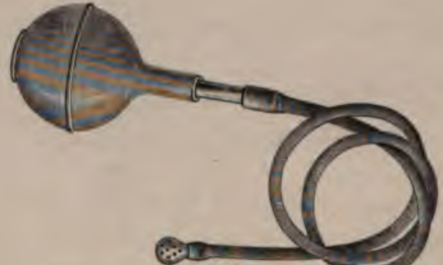


Fig. 47.—Kelly's Evacuator.

Palpation of the ureters, by which thickening and inflammation of the canal may be determined, is practised by passing the finger behind the uterus in the vagina, and then drawing it forward upon either side of the cervix (Sanger). The ureter will slip over the finger, giving the sensation of a good-sized cord. In inflammation it will be thickened, and the patient will complain of pain. In a recent case blood and urine were ejected with force from the urethra when pressure was made over the right ureter.

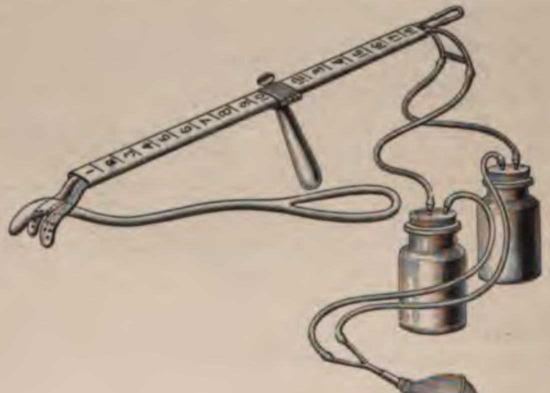


Fig. 48.—Harris' Double Catheter for Obtaining Urine from Kidneys Separately.

ABDOMINAL EXAMINATION.

90. Preliminaries.—The appearance of the patient and her subjective symptoms will indicate the necessity for an examination of the abdomen. The patient must have her clothing so loosened that the entire surface of the abdomen may be exposed. She should lie in the dorsal position, upon an examining chair, a bed, or a table, with the limbs slightly flexed. A sheet is thrown over the lower extremities and drawn over the symphysis, when the clothing is raised and the abdomen exposed.

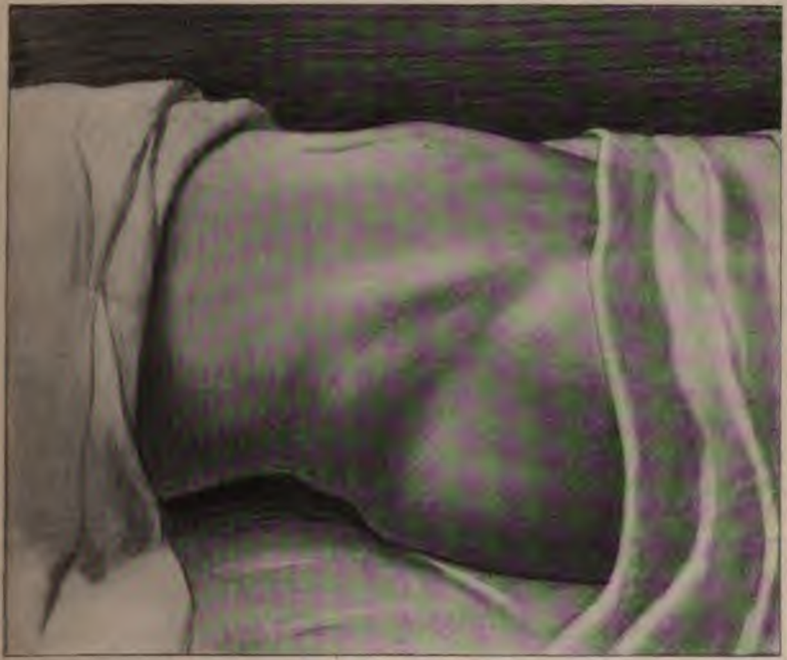


Fig. 49.—Abdomen Prepared for Examination.

91. Inspection.—The study of the external surface of the abdomen is of great value. The linea nigra, linea striata, and increase of pigment about the umbilicus and lower abdomen are symptoms of pregnancy. These discolorations having once occurred are never effaced, and are consequently of significance only during a first pregnancy. The linea striata are red or purple, when recent; white and glistening, when old. They are caused by overstretching of the skin, hence may result from any abdominal enlargement. Discolorations from blisters and counterirritants or scars from leech bites and wet cups are indications of previous inflammation. The superficial abdominal veins are enlarged by any pressure upon the deeper vessels, and the enlargement occurs in pregnancy and in fibroid, ovarian, and other large tumors. The subcutaneous tissues become edematous in general dropsy and from acute abdominal inflammation.

The abdominal enlargement is symmetric, irregular, or nodular; the abdomen is flattened and broadened in ascites, narrowed and projecting in pregnancy, myomata, and ovarian cysts. The tumor is spheric, most prominent above to the right in pregnancy, rises abruptly, attaining the greatest prominence near the umbilicus in ovarian cystomata, and is less likely to be symmetric in myomata. The surface of the skin is smooth and glistening from internal enlargement, and hangs in folds over the symphysis in obesity. A very dependent mass may be due to the protrusion of a large tumor between the separated recti muscles, or to a desmoid tumor of the abdominal walls. A large projection from the median line may be caused by a ventral hernia. Frequently the movements and outlines of the intestinal coils may be recognized. Fetal movements, contraction of muscles, and peristaltic action of the intestines can often be seen. Enlargements in the upper abdomen are due to growths in the liver, distention of the gallbladder, enlargement of the kidney, or malignant disease of the ascending or transverse colon. In the median line the liver, stomach, pancreas, or transverse colon may be the seat of origin. Above, upon the left side, it may be the spleen, the left lobe of the liver, the cardiac end of the stomach, or the left kidney; and below, the descending colon. In the lower abdomen the genital organs afford the majority of abnormal growths. A tumor in the right inguinal region should always awaken a suspicion of appendicial inflammation or malignant disease of the colon.

92. **Palpation.**—Palpation may be practised during the exercise of the preceding step. It consists in placing the hands, previously warmed, upon the bare abdomen, and gently moving them from side to side, now close together, or again bringing the entire abdomen between their grasp. The tips of the fingers or the entire hand may be applied. Palpation enables us to recognize the presence of an abnormal growth; its situation, mobility, density, and relation to the abdominal viscera. Its dimensions, smoothness, or irregularity are recognized by carefully outlining the tumor. The relations and mobility of the growth are determined by changing the position of the patient.

The patient generally should be placed upon her back, with the limbs flexed and the head and shoulders slightly elevated.

The confidence and coöperation of the patient must be obtained in order to secure relaxation of the muscles. It is necessary to proceed with the utmost consideration and gentleness, as rough, hasty, and inconsiderate palpation causes muscular rigidity and defeats the object. Pelvic abnormalities may require vaginal touch in conjunction with palpation, which has already been discussed under the bimanual examination. (Section 62.)

93. **Difficulties.**—Information may be rendered difficult to secure by palpation, by a large deposit of fat in the abdominal walls or by rigidity of the muscles from fear or actual tenderness. The patient may in general be so reassured as to permit the investigation to be satisfactorily completed. In inflammatory collections it is often necessary to exercise care in the procedure to prevent the rupture of the mass and the escape of its contents into the peritoneal cavity.

94. **Percussion,** though described separately, may be practised in conjunction with the two preceding steps. It consists in eliciting resonance or dullness by mediate or immediate percussion. Fluctuation is recognized by placing a hand upon one side and striking upon the abdomen, more or less remotely, with the finger-tips of the other. A long wave indicates that the fluid is free or contained in a large sac. A short or indistinct wave is produced by fluid contained in a sac with numerous partitions or septa. The chief value of percussion is in determining solid or fluid tumors from distentions of the abdomen by gas or ascites.

The ability to elicit resonance and dullness is utilized in the diagnosis between free fluid within the abdomen and that contained within a cyst. In the former a zone of resonance is elicited over the summit of the distention, while the remainder of the surface will be dull. The zone of resonance changes with the position of the patient, while in a cyst there is dullness over its surface and resonance above, and generally upon one side. In the latter the relative outline of the zones of resonance and dullness do not vary with change of position. The solid or cystic tumor, as it increases in size, pushes the viscera upward and to the opposite side; hence the situation of the zone of resonance. Resonance at the summit of the swelling in ascites is due to gas in the intestines, floating them to the surface. Should the mesentery be too short, from inflammation or great abdominal distention, to reach the surface, percussion gives dullness; while deeper pressure displaces the intervening layer of fluid, and again gives resonance. In localized peritoneal accumulations percussion aids only in defining their boundaries, and gives the sensation of fluctuation.

95. **Auscultation** is practised directly by placing the ear over

the abdomen, with a towel or sheet intervening; and, indirectly, through the medium of a stethoscope. The former enables the physician rapidly to find the sound, the latter to study it minutely. Auscultation is of limited application. It enables us to hear the fetal heart-sounds, the bruit produced by the rush of blood through the uterine sinuses, and various sounds induced by gas and liquids in the intestines. The fetal heart-sounds are characteristic of pregnancy; the bruit is heard in pregnancy and fibroid tumors alike. Efforts have been made to diagnose the seat of intestinal obstruction by the gurgling noise in the intestines, but our knowledge of the normal sounds is not sufficiently definite to enable us to make it of much value.

96. **Exploratory Puncture.**—Exploratory operations for the purpose of diagnosis may be one of two classes—*puncture* and *incision*. Puncture is divided into two procedures—tapping and aspiration. The former is applicable to the diagnosis and treatment of ascites; the latter, where it is desirable to lessen the size or to determine the contents of a cyst.

97. **Tapping,** or **paracentesis abdominis,** was at one time the only method of treating abdominal collections of fluid, whether free or confined within a cyst. The instruments should be a trocar and a cannula, about $\frac{1}{8}$ of an inch in diameter, to which a rubber tube may be attached. If Well's blunt cannula is used, a bistoury must be employed to make the incision. The patient is placed upon her side near the edge of the bed; a point is selected in the median line, about midway between umbilicus and symphysis, which percussion has demonstrated is free from intestine; and the surface is frozen by the application of ice and salt or a spray of ethyl chlorid. An incision is made through the skin, and the trocar is plunged, by a quick, rotating thrust, into the peritoneal cavity. The finger is held upon the instrument to govern the distance it is to be introduced. The trocar is withdrawn and a rubber tube is applied to the cannula to convey the fluid into a receptacle. The complete evacuation of the fluid is secured by pressing upon the abdomen toward the cannula. Arrest of the flow by the intestines floating against the end of the cannula can be obviated by changing its position. As the contents are evacuated the entrance of air into the abdomen may

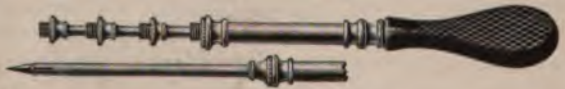


Fig. 50.—Nest of Trocars.

be prevented by keeping the end of the rubber tube submerged. The cannula is withdrawn and a piece of aseptic gauze is placed over the opening and held by a small strip of plaster. The withdrawal of a large quantity of liquid is frequently followed by symptoms of syncope. The patient should be kept in the horizontal position, and, if necessary, given whisky or brandy (f ℥j, per oram), strychnin sulphate (gr. $\frac{1}{60}$ to $\frac{1}{30}$) hypodermically, or inhalations of a few drops of amyl nitrite.

98. **Aspiration** should be the procedure chosen when it is desired to evacuate the contents of a cyst. The use of the trocar favors the entrance of air and of pathogenic germs, and its opening permits the escape of the cyst-contents into the peritoneal cavity, which not infrequently favor the production of peritonitis. The contents of a cyst should consequently be entirely removed if the wall has been perforated. The use of the hypodermic syringe for the withdrawal of a small quantity of fluid for examination is reprehensible. The patient encounters a greater risk from the escape of a portion of the contents of a tense cyst through even a small opening than can be compensated by any advantage derived through an examination of the fluid. For aspiration two instruments may be used, one of which will hold a few ounces, in which the needle is connected with the reservoir; the other, used in large accumulations, consists of a large air-pump connected by tubing with a needle, a quart bottle intervening. Rapid suction exhausts the air in the bottle and causes the fluid to run until the cyst is emptied or the bottle filled. Strong suction when the cyst is nearly empty draws its sides into the needle and stops the flow. The withdrawal of the contents of the cyst is an advisable procedure when the pressure of the tumor is so great as to obstruct the circulation and lead to dyspnea, decreased renal secretion, and more or less anasarca. The operation in such cases, by facilitating restoration of secretion, promotes a favorable result in subsequent removal of the cyst. The procedure may be necessary, also, to prolong the life of the patient until a skilled operator can be secured. *Broad ligament cysts* are occasionally cured by aspiration. It affords an opportunity to clear up the diagnosis in otherwise obscure cases. Two conditions particularly can be determined by microscopic

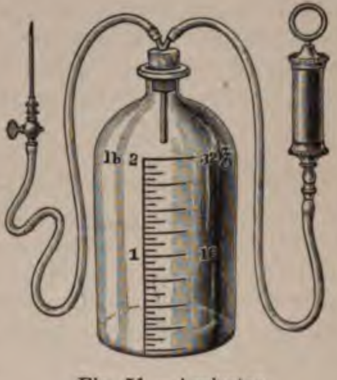


Fig. 51.—Aspirator.

examination of the fluids. *Hydatid disease* is recognized by finding even a single hooklet. *Malignant disease* is determined by finding the presence of blood-corpuscles. The blood is mixed with the fluid. To examine it, the fluid should be drawn into a clean vessel, covered, and permitted to stand for twelve hours, when the blood-corpuscles will be found at the bottom or adherent to the sides of the vessel. *Tapping and aspiration* should always be done through the abdominal walls, never through the vagina or rectum, on account of the more difficult antisepsis and consequent greater danger of infection.

99. **Exploratory incision** in cases of difficult or doubtful diagnosis is a most effective method for making known the condition, but should be very infrequently practised. The more carefully the sense of touch is cultivated, the less frequently will an incision be required. The position of a patient who has nerved herself to undergo an abdominal operation, only to ascertain that her trial and suffering have been without avail, is most distressing, and is not calculated to lead the surgeon frequently to repeat it in cases of extremely doubtful character.

THERAPEUTICS.

100. **Classification.** — Gynecologic therapeutics may be divided into general and local, medical and surgical, and the time will not be misemployed if we consider it from the standpoint of preventive and curative.

101. **Extension.**—A cursory consideration of the subject renders it evident that the capable gynecologist must be versed in medicine, and must be able to distinguish genital affections from disturbances of other organs and to recognize the indications and contraindications for special methods of procedure.

102. **Micro-organisms.**—In the light of our present knowledge no plan of treatment that does not recognize and appreciate the influence upon the genital tract of micro-organisms is worthy of consideration. Of such importance do I consider the study of bacteria and their products that I feel it proper to introduce this subject with an enumeration of the more important bacteria against which our battle must be directed. They are: the gonococcus, the staphylococcus pyogenes aureus, the staphylococcus albus, the streptococcus pyogenes, the bacillus coli communis, and the bacillus tuberculosis.

103. **The staphylococcus pyogenes aureus** is the most important because the most frequent. It is found upon the healthy skin, in the saliva, beneath the nails, in water, and in air,

especially in that of hospital wards. The organisms differ in virulence, but injections of them into the ear of a rabbit have caused death from septicemia. They grow in grape-like clusters, and in the culture-media of the laboratory form golden-yellow masses. The other organisms of this group are less virulent.

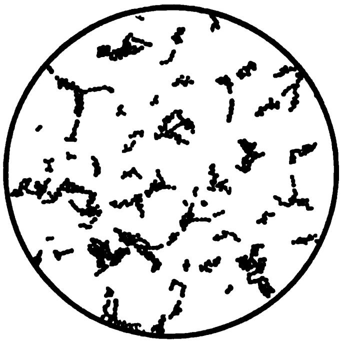


Fig. 52.—Staphylococcus Pyogenes Aureus. From Pure Culture in Bouillon. (Zeiss, 2 mm., Oc. *c.*)

104. The streptococcus pyogenes is very important, as it produces erysipelas and is a frequent cause of postoperative peritonitis. It is not infrequently found in the secretions of the vagina, which doubtless sometimes explains the occurrence of general infection following labor. It grows in the form of chains.

105. The bacillus coli communis grows in the form of rods, and its product is intensely acid. It is constantly found in the feces, and is a frequent cause of acute suppurative peritonitis.

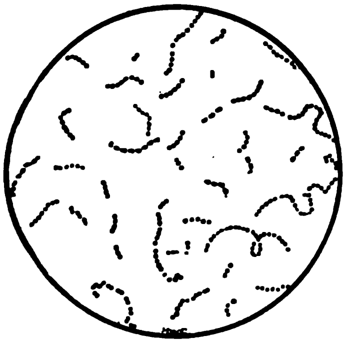


Fig. 53.—Streptococcus Pyogenes. From Culture in Bouillon. (Zeiss, 2 mm. Obj., Oc. *c.*)

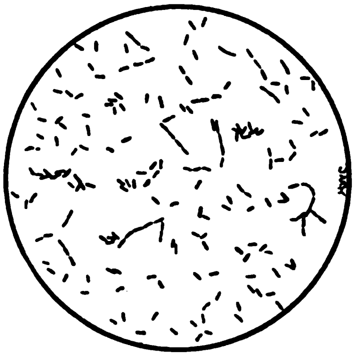


Fig. 54.—Bacillus Coli Communis. From Pure Culture in Bouillon. (Zeiss, 2 mm. Obj., Oc. *c.*)

106. The gonococcus of Neisser, found in gonorrheal discharge, is difficult to cultivate outside of the body. It exists in the form of the diplococcus, penetrates the protoplasm of pus-cells, and rapidly multiplies therein. The cocci develop in cellular epithelium, such as is found in the male and female urethra, Bartholin's glands, the uterine cavity, and the conjunctiva. To the baneful influence of this micro-organism have been attributed nearly all the inflammations of the tubes and ovaries.

107. The bacillus tuberculosis is rarely to be considered in the infection of wounds. It is a cause of inflammation of the peritoneum, to which it is probably conveyed by the blood. The genitalia are sometimes the seat of tubercular disease. It is generally supposed that the infection is conveyed from below through coition.

108. Infection.—Deaths following operation are often attributed to heart failure, shock, pyelonephrosis, and pneumonia, when they are undoubtedly due to infection. Infection is more likely to be introduced into a wound by unclean hands or instruments than by the atmosphere.

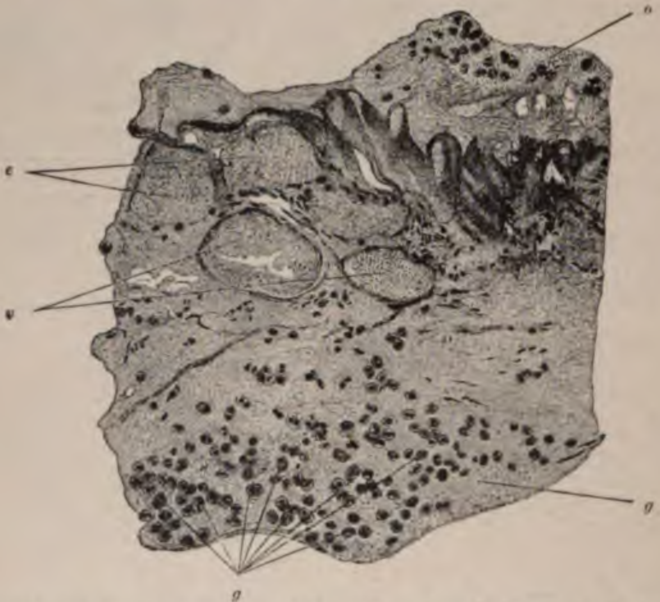


Fig. 55.—One of the Accumulations of Pus-cells under the "Intact" Peritoneum, with Numerous Gonococci within the Pus-cells.—(*Byford, after Wertheim.*)

o. Pus-cells upon peritoneal surface, containing gonococci. *e.* Extravasations of blood. *v.* Veins. *g, g.* Masses of pus-cells deep in the tissues, containing gonococci.

109. Terms.—From the presence of such conditions are derived the terms sepsis, antisepsis, and asepsis. Sepsis, of course, indicates the existence or result of infection; antisepsis, the use of agents which are either destructive to bacteria or hinder their baneful influence. Asepsis comprises the exercise of such means as shall exclude from the field of operation all pathogenic germs and their products. The latter is the ideal procedure, but when we have to deal with agents so intangible that it requires a microscope to discover their presence, and when it is absolutely impossible to preserve aseptic or sterile everything that may come in contact with the affected tissues, a combination of the two methods seems the wiser plan of procedure.

Sterilization means the entire destruction or removal of germs. Complete sterilization of everything is an ideal asepsis.

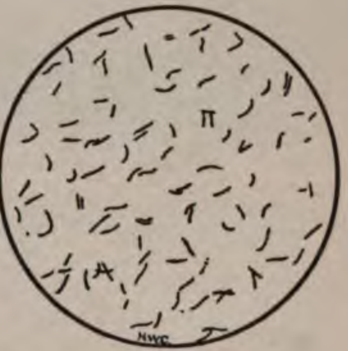


Fig. 56.—Bacillus Tuberculosis. (Zeiss, 2 mm., Oc. *c.*)

110. Sterilization Methods.—The most effective agent for sterilization is the flame, but this can rarely be used because of its destructive influence upon the temper of instruments. It is employed to destroy worthless and dangerous objects, such as soiled dressings.

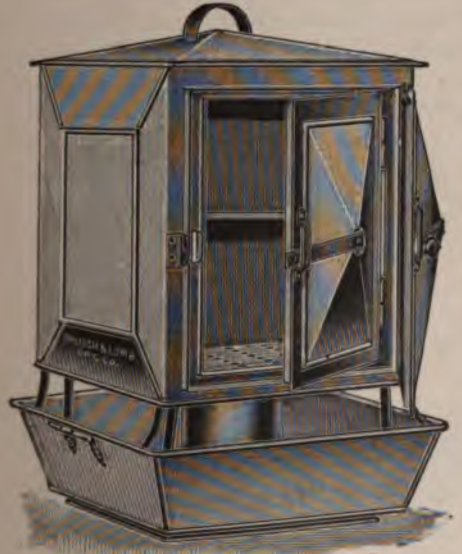


Fig. 57.—Arnold Steam Sterilizer.

Heat may be employed in the dry and moist forms. The vegetative bacteria are destroyed by comparatively low temperatures, from 106° F. to 150° F. The spore-bearing bacilli require a higher temperature and stronger chemic solutions.

Sterilization by dry heat is infrequently employed, for the reason that a temperature of 284° F. for three hours is required to insure the destruction of the spore-producing micro-organisms (Robb). It is rendered unavailable, not only by the time required, but it is injurious to instruments and destructive to ligatures and dressings.

An effective and easy method of sterilization is by the use of steam, which requires an apparatus from which the air can be expelled and the temperature maintained evenly at 212° F. A convenient and cheap apparatus for this purpose is an Arnold's copper sterilizer, which may be used with advantage for the sterilization of bandages, towels, sheets, and dressings. Ligatures and sutures may also be sterilized in the same way. They should be subjected to what is called the fractional method, which consists in placing the material—silk or silkworm-gut—in ignition test-tubes, in either end of which some nonabsorbent cotton is placed. These tubes are placed in a sterilizer, one hour the first day, half an hour each subsequent day, for two succeeding days. The tubes are then placed in a closed jar and kept closed until the time for operation. When dry, they will remain aseptic for an indefinite time. Even with this preparation it is preferable to drop the ligature material for an operation into a boiling soda solution for two minutes prior to its use. Silk will not stand long or repeated boiling without becoming friable.

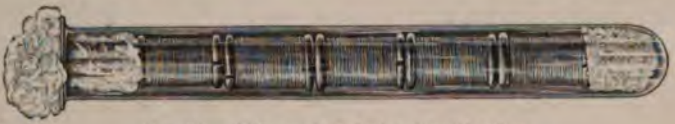


Fig. 58.—Silk on Spools for Sterilization.

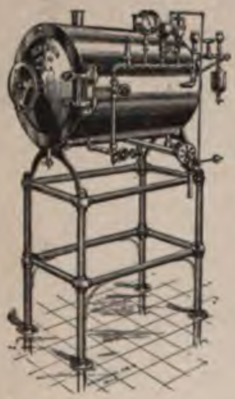


Fig. 59.—Steam-pressure Sterilizer.

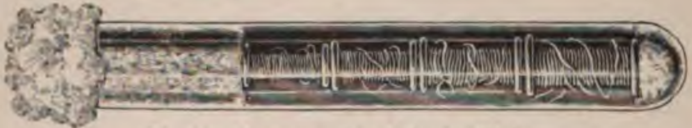


Fig. 60.—Catgut on Spools for Sterilizing.

III. **Sterilization of Instruments.**—The instruments for examination and operation should be capable of being thoroughly cleaned, and after every operation should be cleansed in hot water and boiled before the next operation. They should be placed in trays and immersed in hot sterile water. It was formerly the custom to place instruments in a five per cent. solution of carbolic acid. If the instruments are properly cleansed, the use of this agent is unnecessary, and in many operative procedures, particularly those upon the peritoneal cavity, it is objectionable, in that it causes irritation of the delicate structure of the peritoneum. If they are placed in hot water, and this is changed when it becomes soiled, every purpose is served. The instruments should be sterilized before beginning an operation. Davidson says five minutes' boiling in water destroys all germs, but if the instruments have been used in pus or about gangrenous cases it is important that we should exercise still further precautions to render them absolutely sterile. They may be boiled for half an hour in a five per cent. solution of carbolic acid. The water should be boiling before the instruments are placed within it, or else they will rust. The latter can be avoided by using a one per cent. solution of carbonate of soda. This method of procedure affords a ready means of sterilizing an instrument which has been dropped during an operation. It has the advantage that any vessel can be used. The instrument trays—preferably of glass or porcelain, as being most readily disinfected—should be easily sterilized by heat, or, after careful washing with soap and hot water, should be filled to the brim with 1:500 solution of bichlorid. Trays should be emptied and washed out with plain sterilized water before the instruments are placed in them.

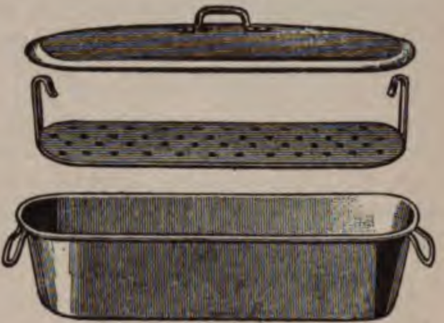


Fig. 61.—Sterilizer for Boiling Instruments.

Fig. 62.—Gauze Pads.

112. Sponges.—Sponges require more care and attention than any other part of the operation. I prefer gauze pads made by taking a yard of gauze and folding it six or eight times, so that it makes a pad from six to eight inches square. All selvage edges are turned in and whipped over by continuous suture. These pads should be boiled for half an hour, dried, and kept in sterile vessels ready for use. It is preferable that they should be again boiled immediately before the operation. These pads are inexpensive and can be thrown away after each operation. When the operator prefers sponges, a good, fine, tough Turkish sponge should be chosen, using a definite number each of round and flat sponges. They should be carefully cleansed by being placed in a towel or bag and pounded with a cane until as much as possible of the dust and sand is removed. Then they are placed in water acidulated with muriatic acid sufficient to give a strong acid taste, in which they remain for twelve hours. This dissolves out the sand and earth. The sponges are then washed in green soap through a number of waters until they become perfectly clean, and are placed in a five per cent. solution of carbolic acid. A good plan of procedure in cleansing sponges is to place them in a solution of hyposulphite of soda—a pound of the salt to a gallon of water for each dozen sponges. Add to this an ounce of muriatic acid or half a pound of oxalic acid. The addition of the acid to the soda results in a double decomposition, in which sulphurous acid and sulphur are set free. The acid burns out the organic material in the sponge and at the same time bleaches it. Sponges should not be permitted to remain in this solution longer than from five to ten minutes. They are then washed in water until there is no longer any whitening of the water with the sulphur. They may then be placed in a five per cent. solution of carbolic acid. When the sponges have been used, they may be washed and used again, unless they have been soiled by contact with some special poison or infectious material, when they should be thrown away. In recleansing the sponges they should first be washed in cold water to remove the blood, then soaked in a solution of washing soda, half a pound to the gallon, and afterward in a solution of hyposulphite of soda and oxalic acid. The solution in which the sponges are kept should be changed every two or three weeks.

113. **Ligature and Suture Material.**—*Methods for Its Preparation and Preservation.*—The material used by the majority of operators is silk. Pozzi recommends that it shall be boiled with carbolic acid, 50 : 1000, wound upon glass reels, and kept in this solution, which should be changed every week. Not too large a quantity should be prepared at once, as the nearer to the operation, the less irritating it is. Hegar uses iodoform silk which is immersed twenty-four hours in iodoform 20 grams, ether 200 grams. This is dried, wound upon bottles, and kept in glass boxes. Silk may also be boiled in a sublimate solution (1 : 1000). Nilson recommends that suture material for superficial stitches

should be boiled in wax and carbolic acid, as it is thus less likely to become infected. Apropos of this method, I used a suture of this kind in closing the lacerated perineum of a patient immediately following labor. Sutures were removed a week later. Two years subsequently, in examination of this patient I noticed a dark speck or groove upon the perineum, and on closer inspection found it to be a ligature that had not been removed. It was raised up, cut, and withdrawn, when it was found that it occupied a groove, which was completely cicatrized and apparently was not irritated. The possibility of infection of silk when used upon the stump of a suppurating tube, or in a pelvic cavity when suppuration is present, and the long-continued sinus that results until the ligature itself has discharged, have led me to prefer some material for ligation that is more certain to be absorbed and will not remain in the tissues so long. I have had occasion to open a sinus and remove a large ligature in one patient, where the operation had been done four years, and the abscess did not form for three and one-half years. Consequently, for some time I have used nothing but catgut for ligatures and internal sutures. This material, when carefully prepared, is perfectly safe, and we have no reason to feel that the patient will experience inconvenience after convalescence occurs. Patients in whom no suppuration has occurred, nor sinus resulted, have subsequently suffered from pressure upon the nerve-fibers by an encysted ligature, requiring reoperation a year or more later for removal of the ligature in order to secure relief. *Catgut for ligature* is prepared as follows: No. 00, No. 0, and No. 2 catgut, as obtained from the shops in long pieces, is placed in ether or benzin for a number of days, or even weeks, to extract the fat. It is removed from this and tightly wrapped upon wooden blocks or glass tumblers, and placed for thirty hours in a solution of bichromate of potash :

℞.	Potassii bichromat.,	1.5
	Acid. carbolic., Glycerin.,	ãã 10.0
	Aqua,	480.0

The bichromate is dissolved in the water, and the carbolic acid and glycerin are added.

The previous fixing of the gut before this immersion in the solution is very important, as it otherwise becomes hopelessly twisted and entangled. After removal from the solution the strands should be wrapped upon previously prepared boards about a meter long for drying. From these boards it is cut in meter lengths, and the pieces are tightly wrapped upon glass drainage-tubes. Each tube contains two pieces of gut. These tubes are placed in a 1 : 1000 solution of sublimate in water for eight hours. This solution is poured off and replaced by a 1 : 500 solution of sublimate in alcohol (90 per cent.), in which the catgut remains for twenty-four hours. From this solution the tubes are lifted by sterile forceps into absolute alcohol to each half pint of which one dram of sterile glycerin has been added. The tubes are removed from this solution for use. Any unused catgut after an operation is not replaced.

The No. 2 gut is employed for ligatures, the No. 00 and No. 0 for sutures. Gut so prepared is, in my experience, unirritating and a satisfactory material for ligatures and sutures.

When it is not desired to harden the catgut or there is no need for its remaining in the tissues for such a length of time, the solution of bichromate of potash may be omitted. Boeckman suggests the following method of rendering the catgut safe for use. The gut, after being cleansed in ether, hardened if desired, and thoroughly dried, is cut into desirable lengths, wrapped in wax paper, sealed in small envelopes, and subjected in a sterilizer to a temperature of a little above 284° F. for four hours. Pus-forming germs are destroyed at lower temperatures, but spore-bearing germs, as anthrax, so common in the intestine of the sheep, are killed only at the higher temperature. The envelopes remain unbroken until the catgut is desired for use. *Silkworm-gut* forms an excellent suture, is clean, not readily infected, and easily taken care of. It may be boiled for ten minutes prior to the operation.

114. **Dressings.**—*Gauzes* medicated with various germicidal or inhibitory agents have been advocated, but do not present any advantages over the sterilized gauze. The latter is nonirritating, and serves every purpose. It should be sterilized by subjecting it to steam by the fractional method. It should be subjected one hour the first day, the second day half an hour, and the third day the same length of time, then dried in a hot oven and placed in a closed vessel, and kept carefully wrapped until it is used.

115. **Operator and Assistants.**—Personal cleanliness should be a matter of conscience. A person with nasal catarrh or bad breath from decayed teeth or foul stomach is disqualified to be either an operator or assistant. This is particularly true in peritoneal operations. Even the slightest examination should not be undertaken unless hands and nails are carefully cleansed, in order to insure against the introduction of infectious material, and in every operative procedure hands and arms should be scrubbed with soap and hot water, giving thorough attention to the condition of the nails. The longer the hands are scrubbed

with soap and water, the less active are the cultures from beneath the finger-nails. After thorough washing with soap and hot water, the nails should be scraped and the washing again repeated. The fingers, and especially about the nails, should be scrubbed with a piece of sterile gauze wet with a 1 : 500 solution of bichlorid in 70 per cent. of alcohol, and subsequently washed in sterile water. Nurses and assistants who are to take part in the operation and handle sponges or dressings should be required to rigidly exercise the same precautions, and should be taught the importance of carefully avoiding contact with any nondisinfected article; and if they should accidentally touch a door, basin, clothing, the face, or any nonsterile object, they should again scrupulously cleanse their hands before coming in contact with dressings or instruments. Kelly advocates, subsequent to scrubbing the hands in soap and hot water, that they should be placed in a solution of permanganate of potash (4 : 1000), and this stain removed by washing in a concentrated solution of oxalic acid, then in lime-water, and finally in sterile water. From considerable experience I have been led to think well of the method suggested by Furbringer, who first washes with soap and hot water, then with bichlorid (preferably the acid solution), following with alcohol at 90 per cent. Before examining a case of cancer where there is considerable decomposing material, it is well to anoint the fingers with turpentine, and then with vaselin, as in this way the disagreeable odor is more readily removed from the fingers. A surgeon engaged in a general surgical practice would do wisely to wear rubber gloves when operating within the peritoneal cavity.

116. Precautions.—During the progress of the operation the operator should have, conveniently situated, two vessels, one containing a solution of 1 : 1000 acid sublimate, and the second sterile water, into which he can dip his hands occasionally during the progress of the operation. In peritoneal operations it is better that the bichlorid should be removed by the sterile water. He should wear clean linen and should have his clothing entirely covered by a sterilized apron. When there is much fluid, as in plastic operations on the vagina, in which continued irrigation is practised, the clothing should be covered with some waterproof material beneath the apron.

117. Room and Environment.—The room and surroundings of the patient should receive careful consideration. The room should be well lighted and ventilated, and thoroughly cleaned; free from matting, hangings, and everything that is likely to retain dust; in fact, no more furniture should be in the room than is absolutely necessary. The operating room should be one in which the walls can be thoroughly washed, and should be carefully cleansed; the furniture should be metal and glass. If not in a hospital, the room should be carefully prepared two days in advance by washing with a carbolic acid solution (50 : 1000). In a private house where the rooms are old or at all suspicious, they should be disinfected by a formaldehyd apparatus. It was formerly the practice to operate under the carbolic acid spray, but it was found to have a prejudicial influence upon the peritoneum. Until quite recently some operators still kept a spray in the room for the moisture and to secure the beneficial influence of the carbolic acid, but the drug was so disagreeable and injurious to many patients that the practice has been discontinued. Sterilized water should be at hand in carefully covered vessels, and when antiseptic solutions are used, they should be designated so that no mistake can be made.

118. Examination and Preparation of Patient.—An examination should be made of the urine, as to its specific gravity, quantity of urea, presence or absence of albumin or sugar, and approximate quantity of solids, and where the conditions indicate it, the microscope should be employed. A fair estimate of the amount of solids may be obtained by Haine's modification of Haeser's method, viz.: "Multiply the last two figures of the specific gravity by the number of ounces of urine passed in twenty-four hours, and this product by one and one-tenth." This estimate includes urea and all other solids. The quantity will depend upon the avoirdupois of the patient. Etheridge has prepared the following table:

WEIGHT.	URINARY SOLIDS.	WEIGHT.	URINARY SOLIDS.
90 pounds	789 grains	140 pounds	1078 grains
100 "	854 "	150 "	1150 "
110 "	916 "	160 "	1198 "
120 "	974 "	170 "	1237 "
130 "	1028 "	180 "	1260 "

The performance of the respective functions of the heart and lungs should be investigated. The bowels should be thoroughly evacuated; this is particularly important when a plastic operation is to be performed upon the rectovaginal septum. The diet should be regulated according to the proposed operation. In peritoneal and intestinal operations milk and other foods containing much waste should be excluded.

Generally half an ounce of Rochelle or Epsom salts, two drams of compound licorice powder, or half a bottle of magnesia citrate may be given the second night and following morning preceding the day set for the operation. A large rectal enema of soapsuds should be given the night preceding. The patient should be kept in bed for twenty-four hours prior to a serious operation. She should be given a general bath twice daily for two days, giving special attention to washing the external genitals, the anus, and the depression of the umbilicus. The abdomen and genitalia should be shaved the evening preceding operation and the abdomen should be washed with tincture of green soap and hot water, using the flesh-brush diligently. If the patient is uncleanly or the skin is oily, the surface should be washed with ether, then with soap and water, and finally with a (1 : 1000) sublimate solution. This washing should be repeated on the morning of the operation, and the abdomen should have a pad saturated with the sublimate solution bound on, to be removed upon the operating table. In every case where the anxiety or nervousness of the patient prevents thorough cleansing the administration of the anesthetic should be immediately followed by a thorough scrubbing of the abdominal surface. Each bath should be accompanied by a vaginal irrigation with a 1 : 2000 sublimate solution.

119. Special Preparation.—*Vaginal Operation.* —The first step should be careful cleansing of the vagina. For this purpose a combination of creolin with green soap is very effectual, using creolin one or two drams, green soap one or two ounces, to the quart of hot water. The vaginal canal should be thoroughly scrubbed with this solution, introducing two fingers wrapped with gauze. This procedure will remove all debris which may have lodged in the crypts and folds of the vagina. The superficial solution should be removed by washing with sterilized water and then with alcohol. Creolin is not so effective an agent in sterilizing the vagina as would be the acid sublimate solution, but has the advantage that it leaves the vagina soft and flexible, which is an important consideration in *obstetrics* as well as in all operative procedures through the vagina. The bichlorid and carbolic acid solutions, on the other hand, have a constringing effect upon the vagina, which renders it less elastic.

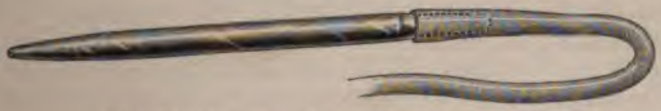


Fig. 63.—Irrigating Glass Tube. Open End.

120. Irrigating Tubes.—All the cannula used for the purpose of cleansing the vagina should be made of glass, as they are more readily cleansed, are less likely to contain infectious material, and are sufficiently cheap to be thrown away after having been used in suspicious cases. When injections are used by the patient, there should be no central opening of the tube, for the reason that the nozle may be introduced directly into a patulous cervical canal, and fluid thrown with some force into the cavity would result in severe uterine colic. Indeed, fluids have been thrown into the uterus and forced by uterine contraction into the tubes, resulting in serious, if not fatal, pelvic inflammation. There is no special advantage in having a curved cannula or tube for irrigation. In the tube used by the physician in an operation there should be but a single orifice, and that a central one. After irrigation has been practised, pressure should be made upon the fourchet, in order to insure the entire escape of fluid. It is sometimes recommended that the irrigation should follow the examination or operation, but we can not too strongly impress upon the student the fact that the genital canal sometimes contains dangerous germs, and that antisepsis must precede as well as follow an operation. In cancer or sloughing fibroids we may, in addition to the ordinary disinfection, require the use of deodorizing agents. For this purpose a three to five per cent. solution of thymol or two or three tablespoonfuls of Labarraque's solution to the quart of water may be used.

121. **Gauze.**—After careful cleansing of the uterus and vagina the canal may be packed, if desired, with iodoform or other antiseptic gauze which will remain sweet for a number of days. Iodoform is preferable to the simple sterilized gauze. To prepare it, ten layers of plain gauze are sterilized by boiling, preferably in a solution of carbonate of potash, washed, then soaked in a solution consisting of iodoform 50, glycerin 100, and ether 700 parts, after which the gauze is passed through a wringer and dried in a darkened isolated room at a temperature of 85 ° F. When dry, it is placed in tin boxes. This gauze should always be sterilized before its use, and can best be accomplished by heating it to the temperature of 250 °F., which destroys both germs and spores. It should be remembered that iodoform is not a germicide. Its value is in its reductive influence upon the ptomains and leucomains, which destroys their deleterious effects. Iodoform is poisonous to some patients. Sometimes it produces high temperature, irritation of the skin, and a smoky, darkened urine, and in other cases, extreme disturbance of the digestive tract. In such idiosyncrasies one of the other forms of antiseptic gauze should be preferred. These comprise borated, salicylated, carbolized, formalized, and acetanilid gauze. Sublimated gauze can be made by first boiling it in a solution of carbonate of potash (20 : 1000), then an hour in a (1 : 1000) sublimate solution, when it is dried in a sterilizing oven and

preserved in close glass jars. Salol and iodol are inferior in their action to iodoform. Carbolic acid is unreliable. Aristol, an agent that is made by the combination of thymol and iodin, is probably preferable to iodoform. It has the advantage of the absence of disagreeable odor. The powder is very dry, not rapidly soluble, and coats over and protects the surface.

122. **Antisepsis of the cervix and uterine cavity** is secured by intra-uterine injections of sublimate solution, carbolic acid, peroxid of hydrogen, or, preferably, formalin (1 : 1000). Of the solutions of mercury, the acid sublimate is preferable, for the reason that it does not form an albuminate of mercury by combination with the serum of the blood, and is less likely to be absorbed and to produce a toxic effect. This agent is not so dangerous as in obstetrics, unless there has been a large denuded surface. In such cases its use should be followed by an injection of sterilized water. In intra-uterine injections a double catheter should be employed, in order that the return flow may not be obstructed. It may be made of hard rubber, glass, celluloid, or metal; the last-named are more likely to be acted upon by the mercury salts. If the uterine cavity is well dilated, the double tube will be unnecessary. After the cavity is carefully cleansed it may be packed with an iodoform gauze tampon, or a pencil of iodoform may be introduced. Von Hacker recommends the following: Iodoform, 5 drams; gum acacia, glycerin, starch, each 30 grains; mix, make pencils, introduce into the cavity of the uterus. When these pencils give rise to uterine colic, it may be preferable to dust the cavity with iodoform through an insufflator, or, still better, the use of aristol by the same means.

In sloughing fibroids or intra-uterine cancer the cavity should be irrigated with an acid sublimate solution (1 : 2000), followed either by sterilized water or a solution of chlorid of sodium (6 : 1000). In operations upon the vagina or cervix continuous irrigation may be practised, using for this purpose a solution of carbolic acid (5 : 1000), sublimate (1 : 2000), or formalin (1 : 1000). The irrigation washes away the blood, renders unnecessary the use of sponges, and the surfaces are constantly kept bathed with the antiseptic fluid. It is the preferable procedure in all operations upon the vulva, vagina, and cervix.

123. **The Use of Tents.**—In dilating the uterus the sponge, tupelo, or laminaria tents, although carefully disinfected, are not without danger. Pozzi recommends the latter tent, but he first immerses it in a saturated solution of carbolic acid and rectified spirits, or in a solution of iodoform and ether with a tenth part alcohol. The objection to the use of tents is the difficulty in previously sterilizing the uterine canal. Unless it is thoroughly

done, as you would in the performance of any operation, the patient is in danger of subsequent inflammatory attacks. For this reason, in the majority of dilatations, I prefer to use the bougies and accomplish rapid dilatation in preference to the slower procedure with the tent.

124. Abdominal Section.—The peritoneum is a membrane exceedingly susceptible to the influence of all chemic agents, and its delicate structure would be injured or destroyed by any agent of sufficient strength to have a germicidal influence; consequently, our aim should be rather to procure asepsis than antisepsis. Assistants must be personally clean. They should have taken a thorough bath on the morning of the operation and should have seen no case of contagious disease prior to its performance. They should remove their coats and vests, roll up their clothing to the elbows, thoroughly scrub their hands and arms with soap and hot water, and wash in disinfectant solutions. Their clothing should be covered with clean sterile linen. They should subsequently avoid shaking hands or touching any objects not disinfected. The operator should postpone the operation if he has the smallest suppurating sore on his hands, or should use a pair of rubber gloves, to prevent infection of the wound.

125. Indications for Anesthesia.—The use of some anesthetic is necessary in the performance of many operations, and is of great advantage in all. In nervous patients, or in those in whom the abdomen and the organs of the pelvis are very tender from the presence of inflammation, the administration of an anesthetic renders an examination much more satisfactory to the physician and less distressing to the patient.

126. Agents Employed.—In an examination it is undesirable that the patient should be long under the influence of an anesthetic or should have a large quantity administered. *Ether* and *chloroform* are objectionable, first, because of the length of time required to secure insensibility and recover consciousness; second, the subsequent nausea and vomiting, which frequently last for hours. *Nitrous oxid gas* is an agent which produces prompt unconsciousness, and from which the patient as promptly recovers, but it requires a special, quite expensive, and rather unwieldy apparatus.

Bromid of ethyl is almost as rapid in its effects as the nitrous oxid, requires but a small quantity, the patient regains consciousness almost immediately after the inhalation is discontinued, and its use is much less frequently followed by nausea and vomiting. It can be administered in one's office, and the patient shortly after return to her home, feeling but little the worse for her experience. This agent is very satisfactory for short operations, such as opening abscesses or dilatation of the urethra or anus. In very nervous patients it may precede the administration of ether or chloroform, whereby the stage of excitement and struggling is avoided. For prolonged operations ether and chloroform are to be preferred. *Ether* is generally recognized as the safer drug. In the very young or the aged it is less satisfactory than chloroform, and probably not so safe. *Chloroform* should be preferred in the presence of renal disturbance and when the patient is suffering from emphysema or chronic bronchitis. Some of the French surgeons advocate the administration of $\frac{1}{6}$ of a gr. of sulphate of morphin and $\frac{1}{100}$ of a gr. of sulphate of atropin hypodermically about twenty minutes prior to the administration of chloroform, and claim (1) that it increases the safety by diminishing the danger of syncope; (2) that the patient is much less likely to suffer from nausea and vomiting; (3) that the patient, having taken a smaller amount of the vapor, recovers consciousness more quickly. The administration of a mixture of *chloroform* and *oxygen*, obtained by passing oxygen through a bottle of chloroform to the inhaler, decreases the danger of this agent and accomplishes anesthesia with the minimum quantity of the drug, without discomfort, with lessened nausea, and with slight subsequent distress. The patient does not have the blanched appearance of the face, and rapidly recovers when its administration is suspended. We do not feel it necessary to de-

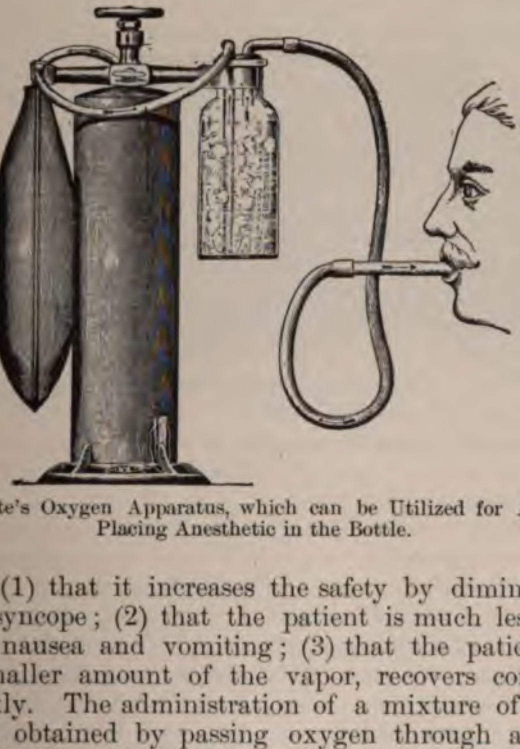


Fig. 64.—White's Oxygen Apparatus, which can be Utilized for Anesthesia by Placing Anesthetic in the Bottle.

scribe the administration of the anesthetic further than to caution that false teeth and foreign bodies should be removed from the mouth.

127. Administration.—The patient should be directed to breathe deeply. She should be reassured by the physician, both in speech and manner. Talking upon the part of the administrator or attendants should be avoided. The pulse, respiration, and condition of the pupil should be continually observed. Dilatation of pupils, blanching of the face, arrested or stertorous breathing, and sudden feebleness of the pulse should indicate the temporary withdrawal of the vapor. Continued syncope, particularly in chloroform narcosis, requires resort to artificial respiration, and often suspension of the patient with head downward. The administrator of the anesthetic should be provided with a hypodermic syringe, solutions of strychnin and atropin, and some nitrate of amyl. The latter agent is of advantage for inhalation, as it produces cerebral congestion. When chloroform is largely given, a bellows and mask, by which the lungs can be inflated with air, will not infrequently be effective in saving life. In suspended respiration forcible pulling upon the tongue acts as a respiratory stimulant.

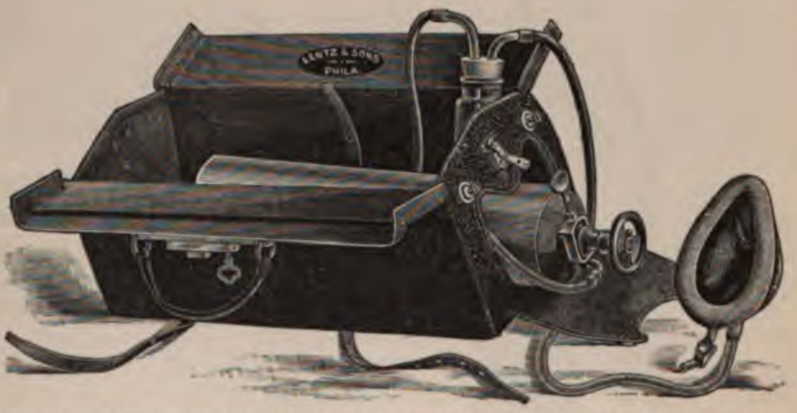


Fig. 65.—Northrup's Apparatus for Administering a Mixture of Chloroform and Oxygen.

128. Local Anesthesia.—General anesthesia is attended with danger in renal disease, in marked pulmonary changes, in fatty degeneration of the heart, and in atheroma of the large vessels. In such cases, and when general anesthesia is objectionable, local anesthesia may be employed. Freezing by ice and salt, by ether, or by ethyl chlorid spray may be utilized, but its application is limited. Continuous irrigation with carbolic acid has a benumbing effect upon the mucous surfaces, by which pain is obtunded.

Cocain.—The most effective agent for local anesthesia is one of the cocain salts. In operations about the genitals or anus it is preferably given hypodermically, and for this purpose the phenate of cocain is the most satisfactory. It is slower in being absorbed, and is less likely to be a source of infection from the presence of micro-organisms. The injections should be made with a one or two per cent. solution, using as much as from one to three grains of the drug. The injection produces anesthesia for the distance of half an inch from the point of the needle; consequently a number of injections may be required. This method of anesthesia has been effective in amputation of the cervix, trachelorrhaphy, and operations upon hemorrhoids and fistula in ano. The drug sometimes has an alarmingly depressing effect. This symptom, it is said, may be avoided by combining nitroglycerin in the injection. When symptoms of depression occur, resort should be had to strychnin, atropin, alcoholic preparations, and nitroglycerin.

Schleich, of Germany, after considerable experimentation, has suggested three solutions for *infiltration anesthesia.* The basis of all is a solution of two parts sodium chlorid, one-fourth part morphin hydrochlorate, in water one thousand parts, to which, for what is called the stronger solution, two parts cocain hydrochlorate are added—one part for the medium and one-tenth part for the weaker solution. The water and salt are sterilized by heat. A larger syringe than usual is used. The site for operation is carefully cleansed; then, after numbing the surface with an ethyl chlorid spray, a puncture is made and fluid injected until a wheal the size of a dime is raised; the needle is introduced in its margin, and so continued until the entire length of the proposed wound is completed. The first puncture is the only painful one. The insensibility of the skin lasts for from fifteen to twenty minutes.

129. Preliminary Details of Operation.—The presence of the patient, anesthetized, in the operating room presupposes the thorough preparation detailed in the previous paragraphs. A sufficient number of well-drilled assistants should have their duties assigned, so that the operation may proceed without confusion or delay. Instruments, ligatures, dressings, sterilized water, and sponges have been prepared. In abdominal operations the number of sponges should be known, so that they may be accounted for before the wound is closed. It is also important to have a definite number of instruments, as both sponges and instruments, especially hemostatic forceps, have been left in the abdominal cavity. Every step of the operation, to the minutest detail, should be conscientiously watched, for, as the chain is only as strong as its weakest link, so an otherwise perfect aseptic procedure may fail through a single flaw. I have seen the most careful preparations for an operation, and the operator place his silk sutures upon a syringe box; an assistant stroke his mustache, a nurse use her handkerchief, each instance being a break which imperils the result.

130. **Arrangement.**—The instruments should be placed at the right of the operator, so that he can reach them as needed. The sponges should be in the care of a nurse upon the opposite side. She should have two basins; the sponges should be washed in one and placed in clean water. A basin of sterilized hot water should be alongside the instruments for the hands of the operator, and his principal assistant should have another.

131. **Positions of Operator and Assistants.**—In an abdominal section I prefer to stand on the patient's left, with my assistant opposite; the second assistant gives the anesthetic; a third looks after the instruments, ligatures, and sutures. One nurse attends to the sponges, a second changes the water in the basins, especially in those for the hands of the operator and assistant and prepares sterilized water or salt solution for irrigation. A third may be ready for emergency and have the dressings ready upon the completion of the operation.

132. **Clothing of Patient.**—The patient will be better to have all clothing removed, as it becomes soiled during the operation. Clean blankets should be wrapped about the upper part of the body and the lower extremities. These should be covered with sterilized towels, and over all a sterilized sheet, in the center of which an opening has been prepared for exposure of the field of operation.

133. **Incision.**—The linea alba is chosen for the site of incision in the majority of cases of abdominal section. A cut, varying in length from two to twelve inches, according to the condition for which the operation is done, is made with a sharp knife. When the abdomen is moderately distended with a growth, the first sweep of the knife should reach the fascia over the peritoneum. The operator and his assistant with long dissecting forceps pick up the peritoneum and cut it between them, thus avoiding injury to the cyst, or, when the abdomen is undistended, a knuckle of intestine.

As soon as the peritoneum is opened the atmospheric pressure carries the intestine out of the way, when the incision may be completed with a knife or with probe-pointed scissors, introducing two fingers as a guard. Should considerable bleeding occur after the first sweep of the knife, it can usually be controlled by pressure with a gauze pad wrung out of hot water.

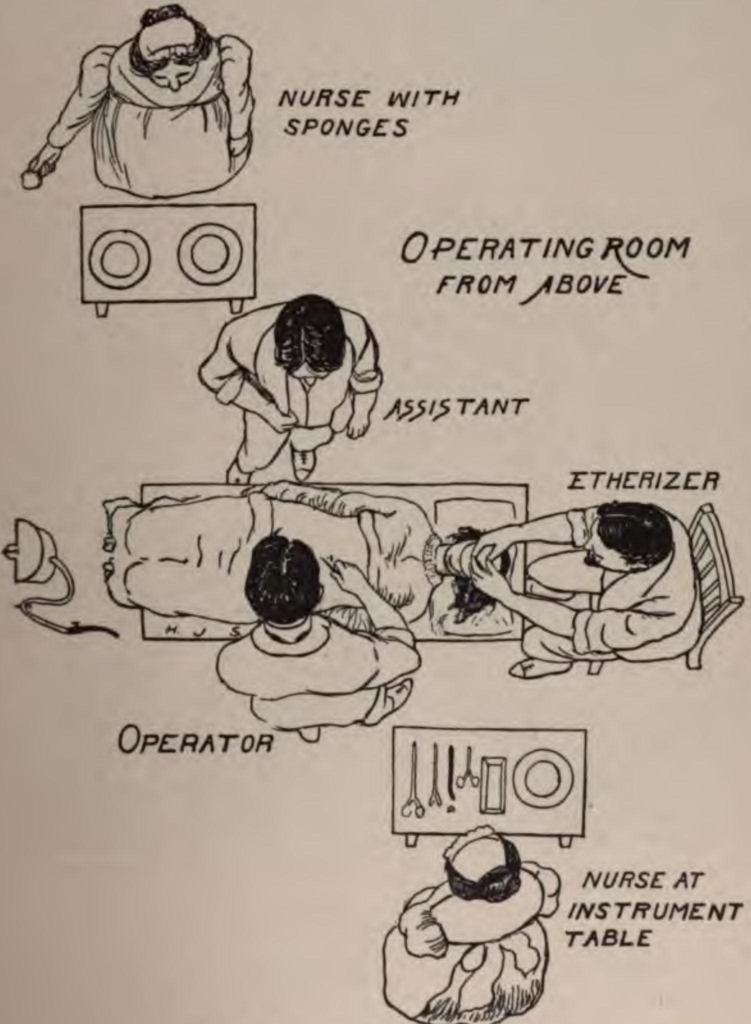


Fig. 66.—Arrangement of Operating Room.

When this is insufficient, the bleeding vessels should be seized by hemostatic forceps.

The length of the incision has been a prolific source of discussion. It has but little influence upon the result. It should be sufficiently long to permit the object of the operation to be accomplished with ease and as little irritation as possible. A long incision, if properly united, will be as firm as a short one.

134. Adhesions.—In inflammation complicating a cyst it may be difficult to determine when we are through the peritoneum. In case of doubt it is better to continue the incision until the cyst is opened, when the line of union can be more readily determined. It is well to remember that at the umbilicus the peritoneum is closely united to the overlying tissue, and this fact may be utilized in cases of uncertainty. As far as possible, separation of adhesions should take place under the eye, by drawing them down to the incision. Vascular adhesions and every bleeding vessel should be secured by forceps or should be ligated.

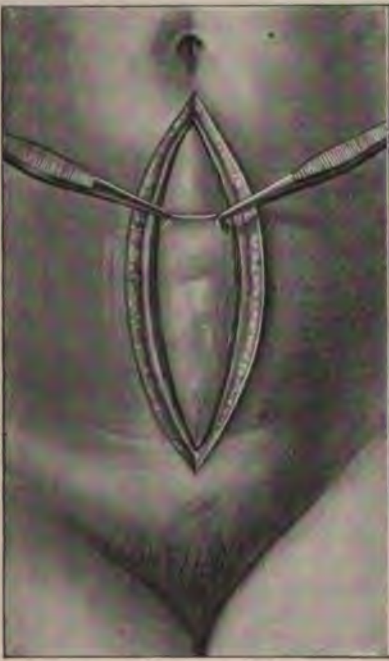


Fig. 67.—Abdominal Wall; Incised Peritoneum Picked up by Dissecting Forceps.

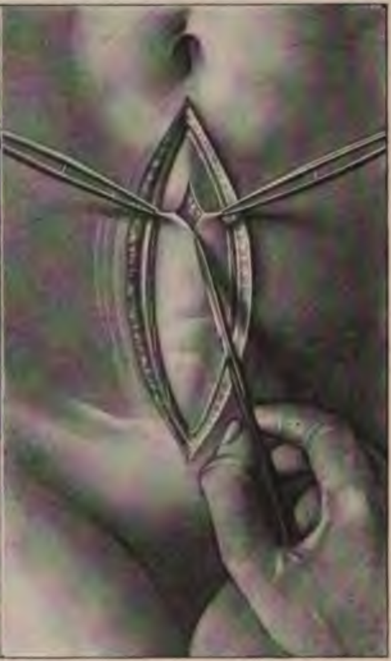


Fig. 68.—Peritoneum Incised.

With the application of forceps the number of necessary ligations will be reduced, as the pressure will often prevent subsequent bleeding. The wound should not be closed so long as a large vessel is bleeding. In short, firm intestinal adhesions the greatest safety is assured by keeping close to the cyst. In some cases it may be necessary to cut into the cyst, leaving a portion attached to the intestine, always taking the precaution, however, to remove its inner, secreting surface.

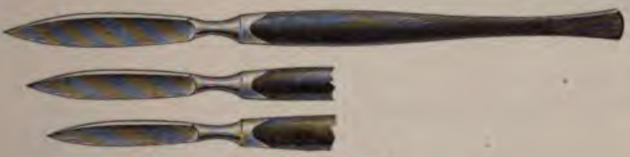


Fig. 69.—Scalpels.

135. Toilet of the Peritoneum.—In the removal of large cysts care should be exercised that their contents do not escape into the abdomen. If the contents are uncontaminated, consisting of thin, serous fluid, it should be removed by sponging only. Where irritating fluid, however, has entered the cavity, irrigation with a sterilized normal salt solution should be practised. This is effectively accomplished by pouring the belly full of water, churning it about, pressing it out, and removing the remainder with sponges. All bleeding points must be secured. If there is oozing from a large surface, sponges wrung out of hot water should be packed firmly upon it until after the sutures are introduced, when they can be removed. If it still continues to bleed, it should be sponged with a hot solution (10 per cent.) of ferripyrin. Should it be still persistent, the gauze pack affords an efficient means of control.

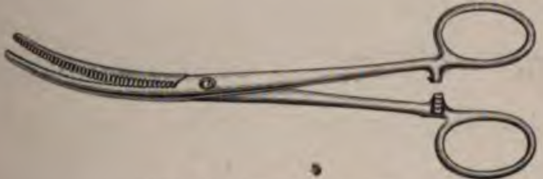


Fig. 70.—Pressure Forceps.

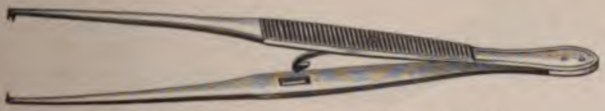


Fig. 71.—Dissecting Forceps—Long Bladed.

136. Drainage.—The subject of drainage requires considerable judgment. Keith's rule is a good one. Drainage should be used only when there is something to be drained. It is generally effected by means of glass drainage-tubes, from six to eight inches long, which have a number of small perforations at the lower extremity. These openings should be small, otherwise portions of intestine or omentum slip into them and become strangulated or render the removal of the tube painfully difficult. The openings should be smooth, and should be beveled at the expense of the outer surface. The lower end of the tube should be open; the external end should be provided with a flange, over which a piece of rubber dam may be placed to prevent soiling of the dressings. The caliber of the tube should not exceed one-third of an inch. The drainage-tube requires most exacting care upon the part of the nurse and the physician. Every precaution must be exercised to prevent its becoming a gateway for the entrance of infection. It should be cleaned every half hour or oftener so long as there is any discharge. This may be accomplished by the use of a

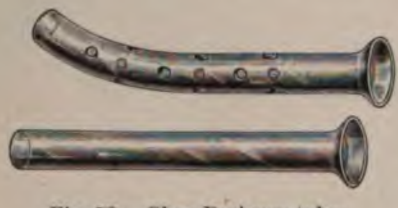


Fig. 72.—Glass Drainage-tubes.

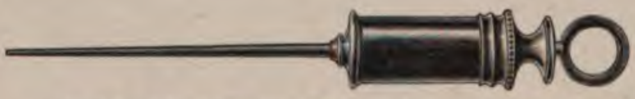


Fig. 73.—Uterine Syringe for Cleansing Drainage-tube.

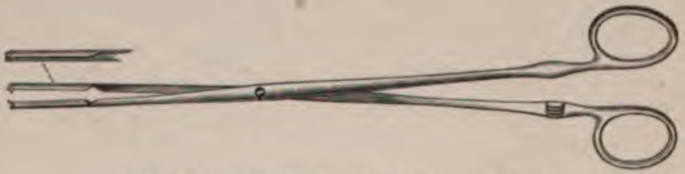


Fig. 74.—Tube Forceps for Cotton Pledgets.

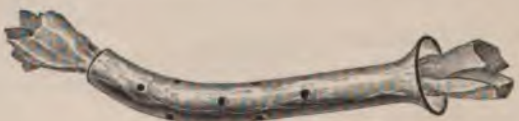


Fig. 75.—Gauze Wick in Drain.

suction tube reaching to the bottom of the tube, or, probably better, by tube-forceps and pledgets of sterilized absorbent cotton. The frequent cleansing of the tube may be avoided by passing a strip of sterile gauze to its bottom, which acts as a wick.

137. Objections to Drainage.—The objections to the glass drain are: (1) It obliges the patient to be confined upon her back; (2) unless carefully placed it may cause sufficient pressure upon the rectum to lead to ulceration and a fecal fistula; (3) it increases the difficulty in keeping the wound aseptic, and it affords ingress to pathogenic germs, either through its cavity or along its sides; (4) it renders the abdomen weak, increasing the danger of ventral hernia; (5) it endangers the formation of a sinus, which will be long in closing. The introduction of large quantities of normal salt solution, which dilute the infectious material and render it more readily controlled by the peritoneum, decreases the frequency with which drainage will be required.

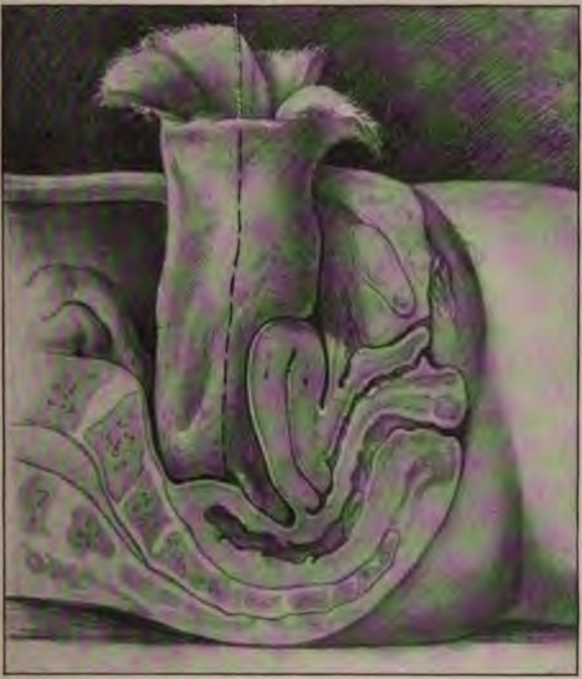


Fig. 76.—Mikulicz Drain.

138. Gauze Drain.—Drainage may be frequently accomplished by a twist of gauze, or, where there is much oozing, may be associated with pressure. The Mikulicz drain consists of a piece of gauze with a string tied to its center, placed in the bottom of the pelvis, within which strips of gauze are packed, and these should be marked, to designate the order in which they were introduced. The pain in removing can be greatly decreased by covering it with rubber tissue except at its extremity.

139. **Where Placed.**—The drain, whether glass tube or gauze, is generally placed in the lower angle of the wound, though it may be placed between sutures at whatever part of the wound is most favorable.

140. **Postural Drainage.**—The uninjured peritoneum is a very active absorbing surface, and Clark has utilized this fact to avoid the introduction of a drain by elevating the foot of the bed eighteen inches for from twenty-four to thirty-six hours, by which the fluid is drained away from the injured surfaces. The danger of infection is lessened by active irrigation with a large quantity of normal salt solution before the wound is closed. The activity of any pathogenic material unremoved from the abdomen is diminished by dilution, through the retention of a considerable quantity of the solution when the wound is closed.

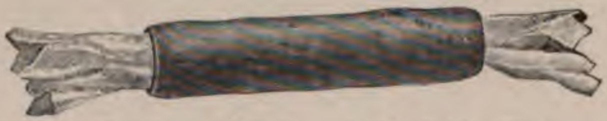


Fig. 77.—Gauze Drain Covered with Rubber Tissue.

This position also decreases the pain following the operation by the lessened quantity of blood sent into the vessels of the elevated pelvis.

141. **Closure of the Wound.**—Before the sutures are introduced the omentum is generally drawn over the intestines. When there have been extensive adhesions or purulent discharge, the belly should be left filled with a sterile normal salt solution. The wound may be closed by through-and-through interrupted sutures or by buried sutures in separate layers. The interrupted sutures of silk, silkworm-gut, silver wire, or chromicized catgut, are introduced through the entire thickness of the abdominal wall, about three to the inch, including $\frac{1}{8}$ of an inch of the peritoneal and $\frac{1}{4}$ of an inch of the skin surface on each side. Each suture is secured with a pair of hemostats, and after all are introduced, a gauze pad, which was placed over the intestines, is removed, the cavity is inspected, and the sutures are tied.

Care must be exercised that a knuckle of intestine or a piece of omentum is not caught by the sutures.

The most important consideration is the union of the aponeurosis, for upon its accurate union depends the future strength of the abdominal wall.

Edebohls closes the peritoneum, muscle, and aponeurosis with No. 00 or No. 0 chromicized catgut. Beginning at the upper angle of the wound, a continuous suture is passed through the peritoneum and the lower half of the muscle, until the lower angle of the wound is reached; then, returning with the same suture, the upper half of the muscle and the aponeurosis are united, tying to the free end at the upper angle one knot for the double suture. A method of suturing has been suggested by Haughey, of Battle Creek, Mich., which consists of a continuous suture each of silkworm-gut for peritoneum, aponeurosis, and skin, the ends of each suture brought out through the skin near the angle of the wound, and secured by perforated shot compressed over small aluminium plates. The skin suture is subcuticular. A more satisfactory method of wound closing, in my experience, is first to close the peritoneum with a continuous suture of catgut, then interrupted sutures of silkworm-gut, each of which includes the entire wall above the peritoneum; before these are tied the surface is carefully dried and the aponeurosis approximated by a continuous catgut suture. The interrupted sutures are then tied sufficiently close to hold the surfaces snugly in apposition, without undue tension.

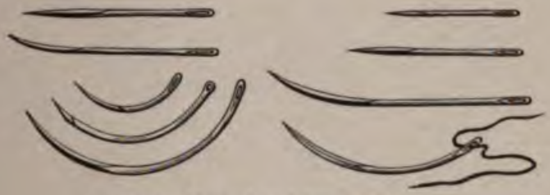


Fig. 78.—Curved and Straight Needles.

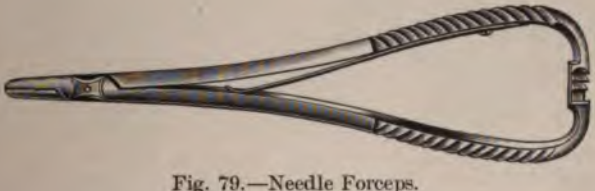


Fig. 79.—Needle Forceps.

142. Dressing.—After the wound is closed it is washed with sterile water and a sterile towel is pressed upon it, while the remaining surface of the abdomen is being cleansed and dried. The wound surface may be dusted with iodoform and boric acid (1 : 7), with acetanilid powder, which is fully as effective and much cheaper, while free from disagreeable odor, or it does equally well without anything intervening between it and the gauze. The wound is covered with gauze wet with (1 : 1000) sublimate solution; then with several layers of plain sterilized gauze, over which is placed a thick layer of sterilized nonabsorbent cotton, enveloped by a piece of sterile gauze,—all of which is held in place by tapes attached to pieces of plaster, three on each side,—and, finally, a sterilized bandage. The use of the tapes affords a ready method of frequent examination of the wound without annoyance to the patient.

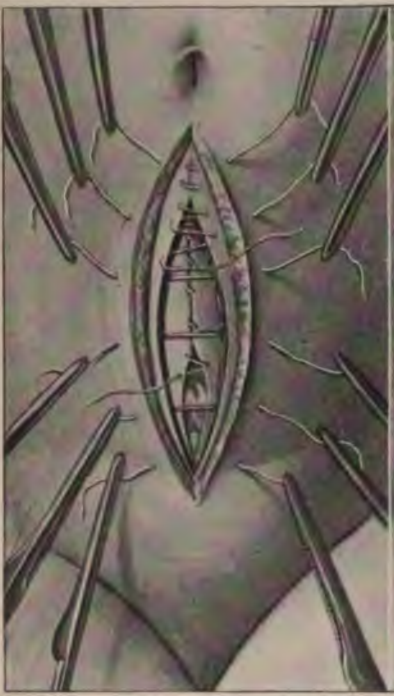


Fig. 80.—1. Peritoneum Nearly Closed with Continuous Catgut. 2. Silkworm-gut Sutures through All Structures above Peritoneum. 3. Aponeurosis Being United with Continuous Suture of Catgut.

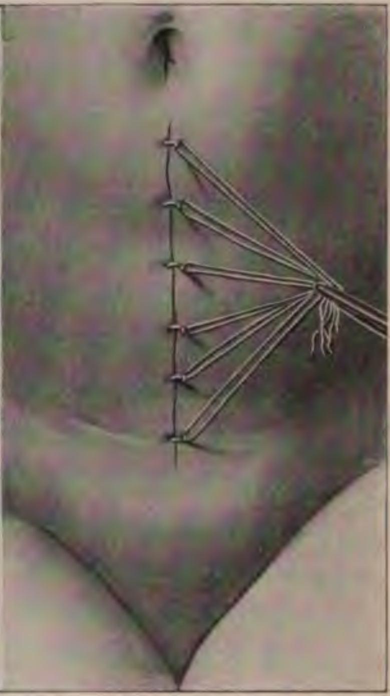


Fig 81.—Silkworm-gut Sutures Tied.

143. **Postoperative Treatment.**—The most frequent procedures, both before and after an operation, which should receive consideration are the use of the hypodermic syringe and of the catheter. I have frequently seen serious septic processes develop from the use of the hypodermic needle, and many patients suffer more from the careless use of the catheter than they did from the condition for which the operation was performed.

144. **Precautions in the Use of the Hypodermic Syringe.**—In the use of the hypodermic syringe there are four sources of infection: (1) The hands of the operator; (2) the instrument; (3) the fluids to be injected; and (4) the skin of the patient. The syringe is difficult to keep aseptic. The metal instrument may be boiled in a soda solution. If you have a glass instrument the piston should be withdrawn and it and the barrel should be placed in a five per cent. solution of carbolic acid; the needles, if platinum, may be put through the alcohol flame, but ordinary needles would be destroyed, and should be boiled. Solutions of atropin, morphin, cocain, strychnin, and ergotin favor the development of bacteria, and when kept for some time, will be found swarming with micro-organisms. Cocain may be kept in a (1 : 10,000) bichlorid solution; the others named may be preserved by the addition of a few drops of carbolic acid to the ounce of solution. Probably the safest method is to make up the solution of morphin or atropin from tablets, which can be dissolved by boiling without affecting the action of the drug.

145. **Catheterization.**—Probably no procedure is so frequently performed as catheterization with so little consideration of the distressing symptoms which arise from infection of the urethra and bladder and the serious results of extension of the disease to the ureters and pelves of the kidneys. Fortunately, the female urethra is short, and permits the use of a glass catheter, which can be kept clean. The instrument should be scalded before and after being used, and should be kept in a five per cent. solution of carbolic acid during the intervals. It should be free from cutting edges.

The labia should be separated, exposing the urethral orifice, when the vestibule should be sponged with a solution of boric acid or sterile water. The catheter should be gently introduced. Should the urethra become painful or irritation of the bladder occur from frequent use of the catheter, the bladder should be irrigated with a hot boric acid solution. After an abdominal operation the catheter need not be used for twelve hours, unless the patient sooner experiences distress.

146. **Comfort of Patient.**—Immediately after the operation the patient is placed in bed, covered warmly, protected from

draft, and kept quiet; the room should be darkened. If the operation has been protracted or the patient is depressed, hot-water bottles should be placed about her to maintain the body-heat. These bottles should be tightly corked and should have a blanket between them and the skin. The patient, unable to understand or to make known her discomfort, may be badly burned if such precautions are not exercised. As she recovers, it becomes very irksome to remain in one position. An attentive nurse can greatly add to her comfort by passing her hands under the patient so that cool air reaches the heated back, by changing her from one side of the bed to the other, and by keeping the clothing under her smooth and dry. Unless there is some especial contra-indication, as the presence of a drainage-tube, she may be turned upon her side. The nurse can accomplish this in part and can give great comfort to the patient by raising the mattress and slipping pillows under it, thus resting the back. One of the earliest symptoms of which the patient complains is intolerable thirst. It is better to limit the quantity of liquid for the first few hours to small quantities of hot water—a half ounce every hour, given with a horn spoon, as the china cup would burn the lips. Ice should not be given; it increases the thirst and the patient will not be content without a piece constantly in her mouth. Both mouth and stomach soon become irritated. When the patient does well, she can have a cup of tea or coffee on the morning following the operation, small quantities of ice-water or soda-water, a teaspoonful of beef-juice every three hours; and on the second day light food, and by the end of the week a generous diet.

147. **Vomiting** should be an indication to discontinue everything by the mouth. Enemas of warm water, six to eight ounces, may be given to assuage thirst, and when the patient is in need of nourishment, nutrient enemas may be given every three or four hours. Nausea and vomiting are very frequent symptoms, which come on immediately after an operation, and may continue several days. The ejected material may be the fluid which has been ingested, or bile, mucus, or the contents of the small intestine. The application of a mustard plaster and an enema of 30 grains of chloral and 1 dram of potassium bromid in 2 ounces of warm water will often be sufficient to quiet the irritability. If the patient is constantly retching, it is better to give a large draft of water with 1 dram of bicarbonate of soda, a cup of weak tea, or some soda-water.

Professor Hare has suggested 2 grains of acetanilid and $\frac{1}{2}$ of a grain of caffein citrate, to be repeated in two hours. I have found it of advantage in vomiting from ether. Other remedies of more or less value are: cocain (4 per cent. solution) 5 drops every hour; tincture of nux vomica, 3 drops every hour; 2 drops of compound tincture of iodin and ⅛ of a grain of carbolic acid every hour; or 1 drop of Fowler's solution every half hour. The earlier the bowels can be evacuated, the sooner will the offensive material be removed; hence, the most effective treatment will be the administration of a saline, or, when it can not be retained, the use of calomel, alone or in combination with bicarbonate of soda, 5 grains of the latter to from ½ to 1 grain of the former, every hour until evacuation of the bowels occurs or until eight doses have been taken.

If the intestine is distended and has not yielded to enemas or to the purgatives suggested, and the patient is constantly vomiting small quantities of dark fluid, nothing will give quicker or more lasting relief than the irrigation of the stomach with a stomach-tube. Rectal feeding may be required because of irritable stomach and the enfeebled condition of the patient.

Peptonized milk or broth may be given every three or four hours. When the patient is much depressed, a normal salt solution or whisky in combination with the peptonized food may be given. When rectal feeding is practised, the bowel should be irrigated once or twice daily.

148. **Tympanites** may be the result of a passive collection of gas in the intestines, or may indicate the development of peritonitis. The early passage of flatus is always an encouraging symptom. The sensation of distention may be promptly met by the use of an enema of

$$\left.\begin{array}{l}\text{Magnesia sulph.,}\\ \text{Glycerin,}\\ \text{Water,}\end{array}\right\} \;.\;.\;.\;.\;.\;.\;.\;.\;.\;.\;.\;.\;.\;.\;.\; \bar{a}\bar{a}\ \text{℥j.}$$

This failing to give relief, an enema of two tablespoonfuls of turpentine beaten up with the yolks of two eggs and strained into a quart of soapsuds should be administered. Keith recommends an enema consisting of 6 grains of quinin dissolved in 4 drams of whisky and a couple of ounces of warm water every two hours until three doses have been given. This prescription stimulates the nerve centers and favors peristalsis. If peristaltic action is marked, but is reversed, a hypodermic injection of morphin should be given, to be followed, after a rest of three or four hours, by a repetition of the quinin.

149. **Shock.**—Severe shock should be combated by the use of artificial heat, enemata of coffee and stimulants, suppositories of ice, elevation of the foot of the bed, bandaging the limbs, and hypodermoclysis of normal salt solution in buttocks, beneath the scapula, or directly into a vein. Hypodermic injections of strych-

nin (gr. $\frac{1}{30}$–$\frac{1}{6}$) should be given according to the urgency of the condition; when the shock is profound, the patient may be supported by the hypodermic administration of the testicular fluid in twenty-minim doses three or four times daily. Digitalin (gr. $\frac{1}{10}$–$\frac{1}{4}$) may be given every eight hours, atropin (gr. $\frac{1}{100}$) twice daily.

150. Anodynes.—The patient should be encouraged to bear the pain without an anodyne. If very severe, it may be allayed by the rectal use of chloral, 30 grains in two ounces of warm water.

When the patient is very much distressed, it may become a choice between the two evils—morphin or restlessness; and a hypodermic injection of from $\frac{1}{8}$ to $\frac{1}{4}$ of a grain should be given. Morphin decreases peristalsis and favors tympanites, and consequently should, if possible, be avoided.

151. Internal hemorrhage, when the technic is perfect, should not occur. Its existence will be indicated by paleness of lips, feeble or absent pulse, sighing respiration, and clammy perspiration. The use of strychnin or the injection of salt solution favors the increase of hemorrhage. The only proper treatment is the prompt reopening of the wound and the ligation of the bleeding vessel.

152. Removal of Sutures.—The sutures in an ordinary case should be removed about the seventh or eighth day. If the patient has had a complicated convalescence, the union will not be so firm, and it would be better not to remove them until the tenth day. If the sutures are pulling and causing pain, a part of them may be removed. The same care regarding cleanliness and avoidance of sources of infection should be practised as in the operation. The sutures introduced as suggested by Haughey need not be removed for ten days or two weeks. The suture is drawn up for an inch at one end, cut, and the remaining portion withdrawn. The middle suture, unless carefully placed, will sometimes be difficult of removal. A few days' delay will generally facilitate its removal, or it may be secured to a piece of elastic, which will make continuous traction. Leaving the sutures long (see Fig. 81) will facilitate their removal and dispense with the necessity for forceps to lift up the knot. The wound should be dressed as in the beginning.

153. When Permitted to Get Up.—The patient should not be permitted to sit up in bed prior to the sixteenth or eighteenth day, and then only for a few minutes, resting upon a bed-rest. The time may be increased each day, and she can be lifted out upon a chair at the end of the third week.

154. Plastic Operations.—In plastic operations the same precautions of cleanliness must be observed. Sponging can be decreased by the use of continuous irrigation. The parts may be dusted with acetanilid or iodoform and boric acid. The parts should be dressed with sterilized gauze held in place by a bandage.

Vaginal irrigation should not be practised during the first forty-eight hours, as it interferes with the sealing of the wound by plasma. The patient should be confined to bed at least two weeks, and in perineal operations three weeks are preferable. In combined uterine, vaginal, and perineal operations the internal sutures should remain for three or four weeks.

MEDICAL TREATMENT.

155. General Treatment.—In every case of genital disease it is very important that the various organs of the body should be carefully interrogated as to the performance of their functions. It is a hopeless task to attempt to treat the disease of one organ of the body as if it were not an integral part of the whole, and capable of producing reflex effects upon organs near or remote, or of being itself the seat of reflex conditions. Engorgement of the hepatic system and the consequent hemorrhoidal congestion must be corrected. This is effected by purgatives, laxatives, and alteratives. The patient should have calomel (gr. $\frac{1}{10}$) or podophyllin (gr. $\frac{1}{20}$) at night, followed the next morning by a Seidlitz powder, Rochelle or Epsom salts, phosphate of soda (ʒ ij), or a wine-glass of Hunyadi Janos or Freiderichshall water. If the liver is particularly sluggish, frequent applications of hot water over the hepatic region should be made. Ammonium chlorid or potassium iodid internally may be of service.

Efficient action of the kidneys should be stimulated by the use of diuretics, or want of action should be compensated by increased action of the bowels or skin. As anemia is a frequent accompaniment, the administration of the reconstructives, as quinin, strychnin, arsenic, mercury, the bitters, and, in proper subjects, when the system has been prepared, the use of iron.

No class of diseases has a more profound effect upon the nervous system; hence, the antispasmodics have found favor. In many cases the valerianate of zinc, asafetida, and the bromid salts will prove very grateful. In very nervous and anemic patients the cold pack, followed by massage, will be exceedingly beneficial. The state of the stomach, the heart's action, and the character of the respiration should always receive consideration.

156. Specific Remedies.—The remedies which may be considered as specifically uterine in their action are ergot, hamamelis, hydrastis canadensis, and viburnum prunifolium.

Ergot is generally given in hemorrhage. It acts in two ways: (1) By stimulating the nonstriated muscle-fiber of the blood-vessels, increasing the rapidity of the circulation; (2) its direct action upon the uterine muscle, by which compression is made upon the vessels and a mass within the uterus is gradually extruded.

A combination—

℞. Ext. ergot., ... f℥j
Ext. hamamelis, }
Tr. cinnamomi, } . . . . āā f℥ss. M.
SIG.—fʒj every two or three hours.

This combination is generally more effective than the ergot alone. If the contractions are painful, one or two drops of the fluid extract of cannabis indica will be of benefit.

Hamamelis and hydrastis undoubtedly owe their action to the large amount of tannic acid they contain. Hydrastin or hydrastinin, in doses of from ⅛ to ¼ of a grain, is more effectual in controlling hemorrhage than the fluid extracts.

Viburnum prunifolium has been greatly vaunted as a remedy for the relief of dysmenorrhea or the arrest of threatened abortion, but I have never been able to obtain any perceptible value from its use.

157. Rest and Exercise.—It is very difficult to fix definite rules to guide the patient as to the amount of either rest or exercise she should take. What one person may regard as a pastime, another will consider violent exercise. Women with inflammatory or engorged uteri are benefited by certain hours of rest each day. The change of position permits the blood-vessels to secure relief. Not infrequently, relief is enhanced by elevating the foot of the bed or by resting the pelvis upon a firm pillow. In predisposition to hemorrhage from fibroid, the patient should be kept in bed for a few days prior to and during the menstrual period. Rest is obligatory in all acute inflammatory troubles. Some patients will, however, have to be stimulated to take exercise; they are disposed to go to bed upon the slightest provocation, and remain so long that their muscles become flabby and the vessels grow stagnant; the patient is bedridden, and every effort at exertion is attended with real or imagined pain. Such cases may require resort to massage and electricity to enable them to resume their ordinary duties.

Judicious use of the bicycle will be found a most valuable auxiliary in nervous patients who are dominated by imaginary aches and pains. The increased oxygenation and elimination without doubt frees the patient from the cause of her distress.

LOCAL THERAPEUTICS.

158. **Baths.**—The sitz-bath of hot water in inflammatory and congestive conditions is capable of giving great comfort. It should be followed by rest, and would be contraindicated where there was a tendency to hemorrhage or in a possible pregnancy.

159. **Douche.**—The value of the hot douche was made known by Emmet. It should be given while the patient is in a recumbent position, with a gravity syringe; the more prolonged, the larger the quantity, and the higher the temperature (115° to 120° F.), the more enduring will be the effect. The ordinary fountain syringe, a large vessel with a tube leading from its lower end, or an ordinary pitcher with a rubber tube carried to and held at its bottom by a weight, may be used. Instead of the ordinary rubber, wooden, or metal nozle, a glass end-piece is preferable, as it can be more readily cleansed. When preferred, the water may be medicated with astringents, as alum, sulphate of zinc, acetate of lead, hydrastis, or hamamelis; or with antiseptics, as boric acid, carbolic acid (two to five per cent.), or permanganate of potash (one to two per cent.). The difficulty of saving the clothing from staining renders the use of the latter agent less frequent. Creolin (one to four per cent.) and acid sublimate (1 : 5000 to 1 : 2000) are valuable. The antiseptic injections are of especial value in vaginal discharge, more particularly when of a specific character.

The advent of menstruation is considered as contraindicating irrigation, but it may be resumed before it ceases, particularly when the odor is offensive or the parts are irritated, using plain water, at a temperature of 100° F. If the vaginal discharge is particularly offensive, as in malignant disease, a douche of thymol solution, one or two per cent., is a most excellent deodorizer.

Astringent douches are used in excessive vaginal secretion, but should not be used when the patient is wearing a pessary, as the salts are deposited upon the instrument, roughening its surface, thus increasing the irritation.

Rectal douches may be employed to cleanse the bowel, and for the relief of inflammation of the rectal mucous membrane or for its effect upon the neighboring pelvic organs. The close proximity to the uterus and broad ligaments, and the ability to retain the fluid longer in contact, make the use of the rectal enemata of hot water of especial value. Medicated enemata are used to unload fecal accumulations, for the relief of tympanites, and to medicate local inflammations.

Vesical douches are used for the relief of inflammatory disease of the bladder and urethra.

160. External Applications.—In acute inflammatory difficulties the popular plan of treatment is to employ hot applications, but we have in the ice-bag a far more efficient means of allaying pain and of limiting the area of inflammation. Its persistent application will in many cases secure resolution in what would otherwise prove a serious disorder. The ice-bag over the sacrum affords prompt relief of dysmenorrhea of the congestive form.

161. Counterirritants are productive of benefit in the more chronic forms of disease. Painting the skin over the lower abdomen with tincture of iodin is more frequently resorted to. It may be repeated and continued as long as the skin will bear it. The irritation is increased by the addition of croton oil.

℞.	Ol. tiglii,	f℥j	
	Tr. iodin.,	f℥ij	
	Etheris,	f℥v.	M.

SIG.—Apply with brush externally.

It produces a crop of pustules, which should be allowed to dry before the application is repeated.

The most effective procedure is the application of a blister over the seat of pain or to the inflammatory exudate two or three times a month, but this should not be practised when the patients are much depressed or very anemic.

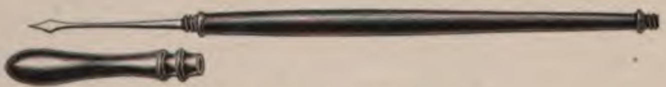


Fig. 82.—Butt Uterine Scarifier.

162. Bloodletting.—The general abstraction of blood is now rarely practised. Doubtless there are many cases in which a good bleeding would cut short a severe illness or abort an inflammatory attack. The local abstraction of blood by the use of a scarifier or by puncturing the cervix will often be effective in relieving the pain of engorgement and in promoting absorption and resolution of inflammatory conditions.

163. Local Applications.—The former method of treatment was the introduction of solid silver nitrate into the uterine cavity, the use of fuming nitric acid, and other powerful caustics. This treatment cured by destroying the glandular tissue of the part. Milder measures are now practised. It should be a well-recognized rule that no intra-uterine medication should be practised unless the uterine canal is freely open to permit of drainage.

Applications to the uterine cavity are made by wrapping a probe or applicator with absorbent cotton, which, after being saturated with the medicinal agent, is carried into the canal. A long pipet may be used for the same purpose. In the use of either procedure it is particularly important that the canal shall be freely open and the organ in good position. Otherwise the contact of the foreign material will produce contractions of the organ, which will result in violent uterine colic. Such attacks have not infrequently been followed by severe inflammation of the adnexa and even of the peritoneum.

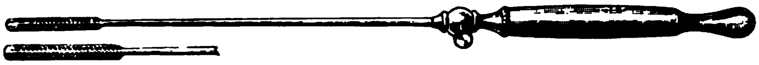


Fig. 83.—Aluminium Uterine Applicator.

To render intra-uterine treatment of value, the plug of thick mucus filling the cervix must first be removed in order to permit the contact of the agent with the affected surfaces.

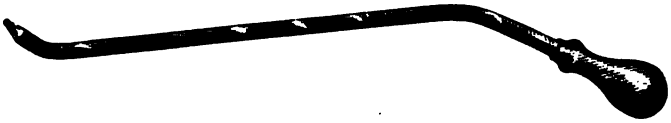


Fig. 84.—Long Glass Pipet.

164. **Various Agents.**—The applications may be classified into antiseptic, astringent, and caustic. The antiseptic applications consist in the use of preparations of carbolic acid, creasote, iodin, and iodoform. Useful combinations are:

℞. Acid. carbolic., ... ʒss
Tr. iodini, ... f℥j. M.

℞. Creasoti,
Glycerin.,
Alcohol., } . . . . āā f℥ss. M.

An astringent effect may be secured by a combination with tannin, as:

℞. Acid. tannic., ... ℥j
Tr. iodini,
Glycerin., } . . . . āā f℥j. M.

The most frequent applications are the tincture of iodin and Churchill's tincture.

Iodoform may be used in the form of crayons, as an ointment, or as a powder, with the insufflator. The various astringents may be applied in powder alone or in combination with boric acid, iodoform, or acetanilid.

165. Astringents.—The most available astringents are alum, borax, sulphate of copper and sulphate of zinc, the tincture of the chlorid of iron, fluid extract of hydrastis, and fluid extract of hamamelis. The solid substances are best used in mild solution. Some of these agents when used without dilution are strongly caustic.

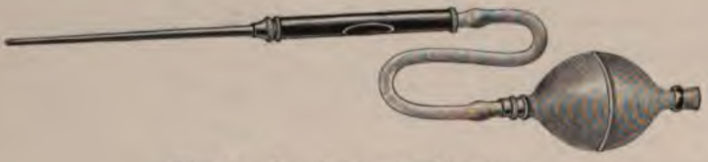


Fig. 85.—Insufflator—Straight Stem.

166. Caustics.—Crayons of sulphate of zinc (fifty per cent.) are very effective for caustic purposes, and are used in aggravated forms of endometritis. Still more effective is the chlorid of zinc in crayons (thirty-three per cent.).

Liquid caustics are nitric acid, acid nitrate of mercury, sulphuric acid, hydrochloric acid, chromic acid, solution of zinc chlorid, solution of silver nitrate, tincture of iron chlorid, carbolic acid, and creasote. It is exceedingly infrequent that the more active caustic agents are required.

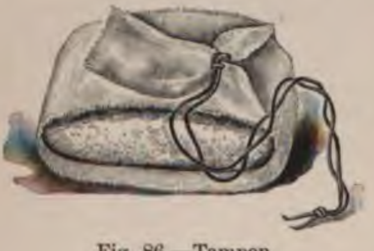


Fig. 86.—Tampon.

167. Tampons made of absorbent cotton, lamb's wool, or gauze afford an efficient method of treating the cervix. The best tampon is composed of a combination of gauze and cotton or lamb's wool. It should have a thread attached, by which it can be withdrawn. The tampon may consist of simple sterilized material or may be medicated with antiseptics, astringents, styptics, anodynes, or alteratives. The principal purpose of the tampon is to sustain the uterus at a higher level, which relieves the patient from the dragging pains due to want of support of a heavy organ, and the change of position improves the circulation; the addition of an antiseptic permits it to be retained for a longer period without becoming foul. Sublimate, from its tendency to irritate the vagina and vulva, can not be satisfactorily used. Carbolic acid, boric acid, and iodoform are most satisfactory. The addition of glycerin is of value. By its affinity for the watery portions of the blood it produces a profuse discharge, which depletes the vessels and favors absorption of exudation. The boroglycerid, glycerite of tannin, and a ten to twenty per cent. solution of ichthyol are popular applications upon the tampon, but the patient should be cautioned, in the use of the two latter, to wear a napkin in order to prevent her clothing from being stained.

Besides supporting the uterus, the tampon may be used to control hemorrhage or discharge; to complete the diagnosis, through the discharge which it secures; to assist in maintaining the uterus in a normal position; and to prepare the way for the use of a pessary.

168. **Massage.**—General massage affords an effective means of promoting nutrition and of improving the condition of patients suffering from chronic pelvic troubles. It increases the number and the activity of the red blood-corpuscles, carries oxygen to the remote tissues and organs, facilitates oxygenation and combustion, and favors absorption, but, best of all, it improves the nerve tonus. Many patients are incapacitated by illness, by aggravated pains, or by disinclination to take exercise. Judiciously regulated massage accomplishes the constitutional changes ordinarily effected by exercise, free from its possible deleterious influences. Slowly the individual is rehabilitated, and as she gradually and insensibly resumes her self-control, she is emancipated from the preexisting unfortunate nerve phenomena.

169. **Pelvic Massage.**—The beneficial results of massage in local inflammations of joints and superficial portions of the body justified the hope that it might be practised with advantage in the conditions of acute and chronic exudations within the pelvis. It has been systematized into a recognized procedure, known as pelvic massage, largely through the study and experiments of Thure-Brandt, a Swedish masseur.

It is practised by having the patient lie upon her back upon a couch or table, with her buttocks close to its edge; the limbs are flexed upon the body. One or two fingers of the left hand are introduced into the vagina, with which the uterus is gently pushed forward against the anterior abdominal wall. The fingers of the right hand are placed upon the abdomen, and are moved in a circulatory or rotatory manner over the surface, or, rather, moving the surface with them in this manner. The greatest gentleness must be exercised in the beginning, increasing the pressure as the patient becomes reassured or as the pain is lessened. As we progress, the fingers may be made to dip down, to push off and separate adherent organs, and to follow lines of cleavage indicating inflammatory adhesions. The seances vary in length from five to fifteen minutes, the shorter time being preferable in the earlier applications, and they should be repeated from three times weekly to once daily. The exercise of this procedure will be found to produce a rapid alteration in inflammatory accumulations, setting free the uterus and its adjacent organs. The procedure will be indicated in all subacute and chronic inflammations of the pelvic organs unassociated with pus formation; in displacements, when fixed by inflammatory adhesions; in subinvolution and hypertrophy of the uterus from chronic interstitial inflammation; and in relaxation of the pelvic floor induced by increased weight of pelvic organs.

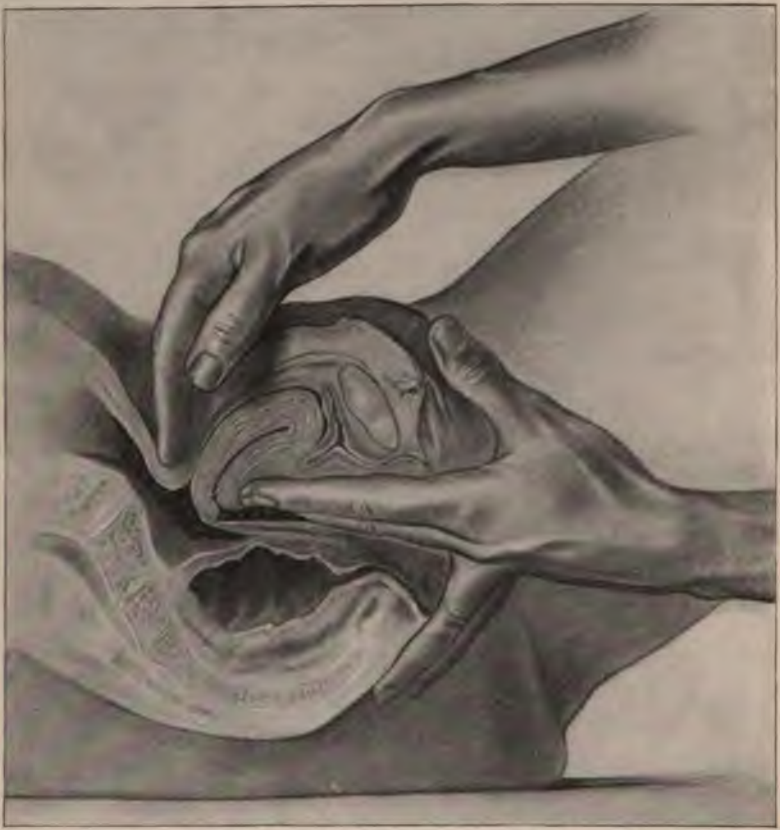


Fig. 87.—Position of the Fingers in Pelvic Massage.

It is contraindicated in the presence of pus formation, whether contained in the tubes or within the pelvic tissues.

Massage is rendered difficult by thick abdominal walls, and in nervous, hysteric women. In the latter, however, much may be done by gentle procedure until the patient's confidence and coöperation are secured.

ELECTRICITY.

170. **Forms.**—The recognition of the value of electricity in the arts and sciences naturally led to its study and utilization in medicine. While the galvanic and faradic currents were early employed in gynecology, it remained for Apostoli to formulate plans for its more accurate dosage and systematic use.

The principal forms in which the electric current is generated and applied are: Franklinic, galvanic, faradic, and sinusoidal.

171. **Franklinism.**—Franklinism is the employment of electricity generated by friction. It is not generally used, but is an excellent nerve stimulant and counterirritant. It has been found of most service in those cases in which the local pelvic lesions are slight or difficult to discover while the element of pain is a marked factor. It has been successfully employed in amenorrhea, in dysmenorrhea, in ovarian, lumbar, or lumbo-abdominal neuralgia, in vaginismus, in hyperesthesia, and in various neurasthenic conditions.

The seances may be continued from six to thirty minutes. The number of applications is indefinite.

172. **Galvanism.**—The advocates for the use of electricity in pelvic disorders have claimed a wide field for the application of galvanism. The greatest value is claimed for its use in hemorrhagic endometritis, in the presence of myomatous growths, and in dysmenorrhea as a result of stenosis.

173. **Apparatus for Application.**—The investigations of Apostoli demonstrated that the application of high powers of electricity resulted in the destruction of tissue in which acid materials were found about the positive pole, while alkalies collected at the negative. The former caused a dry, brownish eschar; the latter, a soft, watery, elastic slough, which did not contract. The resistance of the skin required for the use of high powers a large, inactive electrode externally. Apostoli devised a moist clay pad. Other electrodes are made of a bladder or other animal membrane filled with a salt solution, or of a large metal disc covered with wet cotton or a towel. The internal electrode may be vaginal or intra-uterine. The former may be a knob or a nest of knobs, from which a suitable one can be

selected and attached to a gutta-percha-covered metal rod. The intra-uterine electrode may be a platinum wire or a steel rod insulated to within one or two inches of its end. The insulating sheath of gutta-percha or celluloid may be movable, permitting a larger surface to be subjected to the application.

A battery, either portable or stabile, will be required capable of generating a current of from 200 to 400 milliamperes, and so arranged that the strength of the current may be gradually increased. It should be provided with a galvanometer or a milliamperemeter to measure the current; a rheostat, by which the strength of the current can be governed; a commutator, to permit a change of poles without removal of the electrodes (as a reversal of the poles can not be made without shock, the precaution should be exercised to greatly reduce the intensity of the current before such a change is made).

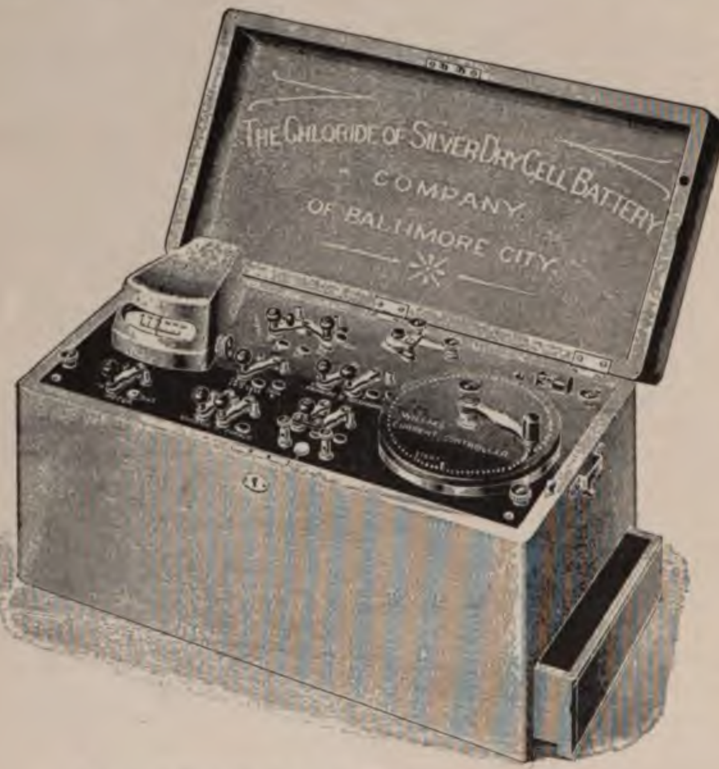


Fig. 88.—Portable Galvanic Battery with Galvanometer.

174. Method of Procedure.—Apostoli's employment of the electric current requires a careful examination and an accurate diagnosis. If a growth, careful measurement from various fixed points should be made in order to be able to determine the results of treatment. The hands, genitalia, and electrodes must be carefully cleansed or disinfected.

Before the external electrode is applied the skin should be carefully examined and all broken places should be covered with collodion or plaster; otherwise the electrode will be unbearable.

The internal electrode should be introduced without the speculum. The patient should be apprised that there will be a slight burning, and that there may be a bloody discharge subsequently. Her clothing should be loosened, her corsets removed, and the bladder and lower bowel emptied. The application should not follow a full meal.

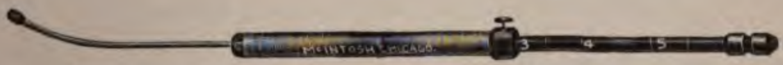


Fig. 89.—Intra-uterine Electrode with Movable Insulating Cover.

During the introduction of the electrodes the current should be closed, and subsequently opened gradually. The first application should be very carefully made, with the endeavor to determine the patient's sensibility. The pole used for the active or intra-uterine electrode must depend somewhat upon the existing conditions. The positive pole possesses the most electrolytic action, is an effective hemostat, and consequently should be employed for hemorrhage. The negative pole acts like an alkali, is the most painful, and is used to decrease the size of a growth or to enlarge a stenosed canal. The duration of the applications may vary from three to ten minutes. The number of applications for an individual case is difficult to fix—generally from twenty to thirty. Their frequency is dependent upon the condition, varying from every eighth day to two or three times weekly.

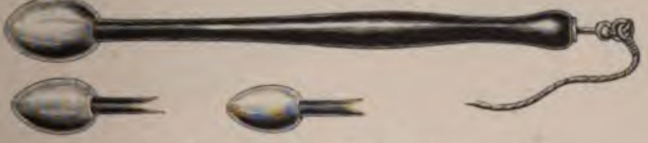


Fig. 90.—Vaginal Electrodes of Different Sizes.

175. Indications.—Its advocates advise the use of galvanism in amenorrhea, dysmenorrhea, and menorrhagia; in chronic inflammation dissociated with suppuration; for the arrest of hemorrhage, relief of pain, and decrease of size in myomatous growths of the uterus, particularly in the submucous and interstitial varieties; and for chronic ovarian inflammation.

176. Contraindications.—According to Apostoli, the galvanic current is contraindicated in the following conditions: (1) Hysteria; (2) intestinal catarrh; (3) pregnancy; (4) malignant degeneration of a tumor; (5) fibrocystic tumors; (6) suppurative inflammation of the adnexa. To these Schaeffer would add any acute or subacute inflammation of the pelvic viscera, a very hard or fully matured tumor, an excessively large growth, a submucous growth which is pedunculated, enfeebled heart action, and acute nephritis.

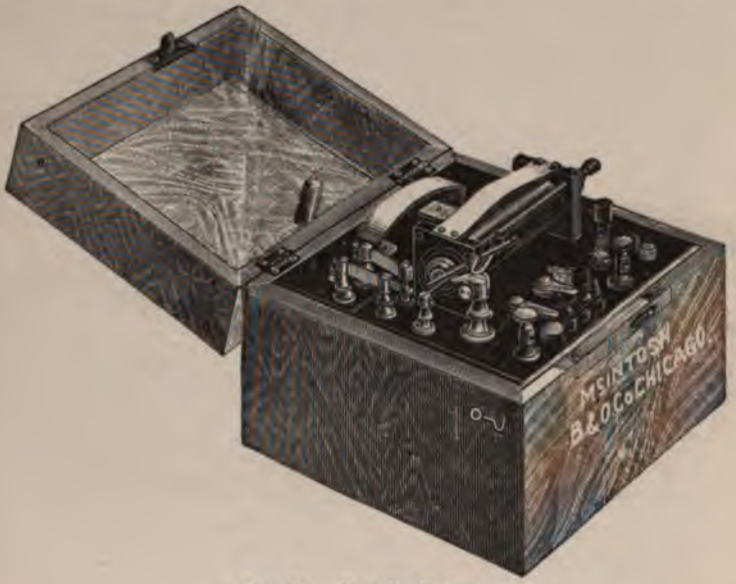


Fig. 91.—Faradic Battery.

177. Faradic.—The current of induction has a primary and a secondary current. One pole may be applied in the vagina or the uterus; the other, over the abdomen. Apostoli advises a bipolar electrode in which the negative and positive poles are placed in the same electrode, with a band of nonconducting material between them. In this way the current of electricity is limited to a greater extent to the tissues desired to be affected. This method of procedure is less painful.

The primary current is that of quantity; the secondary current is one of tension. The latter is dependent upon the length and fineness of the wire. The current of tension is effective in subduing pain, such as ovaralgia, abdominal pain in hysteric women, vaginismus, and pain from pelvic inflammation. It proves to be an emmenagog. It may be applied three times weekly, or even daily, each sitting lasting from ten to thirty minutes. The electrode is first introduced; the current is then opened slowly, and gradually closed before the electrode is removed. This is necessary in order to prevent severe pain.

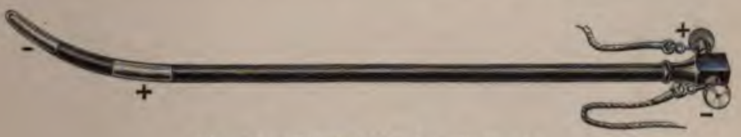


Fig. 92.—Bipolar Uterine Electrode.
+. Positive pole. —. Negative pole.

178. Sinusoidal.—Apostoli has recently made use of the current introduced by d'Arsonval, known as the sinusoidal, which consists in placing the patient upon an insulated couch, beneath which is a large coil of wire, through which a current of 450 milliamperes is passed. This is said to place the patient in an electric atmosphere, in which, without the use of electrodes, the influence upon the individual is such as greatly to affect nutrition. Under this plan of treatment marked changes are said to have taken place in pelvic exudates, the absorption being exceedingly rapid and more effective than under any other plan of treatment.

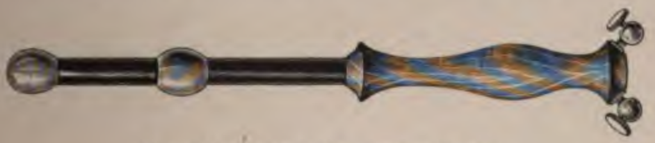


Fig. 93.—Vaginal Electrode—Bipolar.

ANATOMY.

179. Division of Genitalia.—The pelvis is occupied by the genital organs, the bladder and urethra, the rectum, and the anus. The genitalia are divided into the external and internal organs; the former, with the vagina, form the organs of copulation, and the latter, more properly, the reproductive organs.

180. The External Genital Organs.—The external genitalia, from before backward, comprise the mons veneris; the labia majora; the labia minora; the clitoris; the vestibule, perforated by the meatus urethræ externus; the orifice of the vagina, surrounded by the hymen; the fourchet; the fossa navicularis; and the perineum, situated between the vulva and the anus.

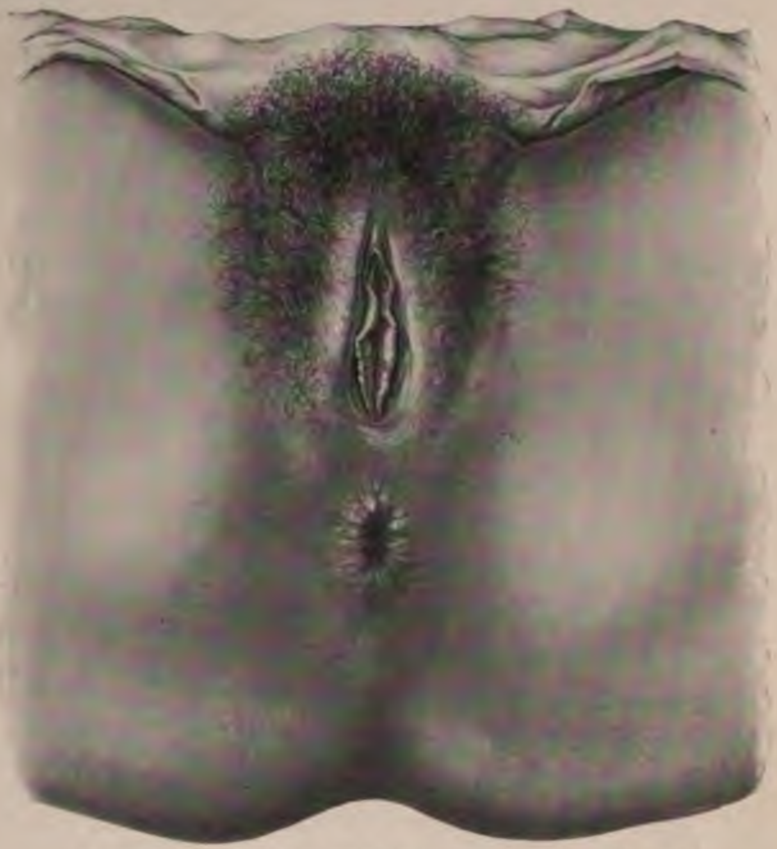


Fig. 94.—Virgin Vulva; Labia Not Separated.—(*From Deaver.*)

The external genitalia are also called the vulva, pudendum, or cunnus; the cleft between the labia majora, the rima pudendum.

181. The mons veneris is the cushion of fat over the pubes, which, abundantly covered with hair, protects the vulva from the perspiration of the body. The mons is the only portion of the genitalia visible when the woman stands erect in the nude state.

182. **The labia majora** are two skin folds, which unite above in the mons veneris, thin off posteriorly, and terminate about 1½ inches in front of the anus. They are covered externally by short, crisp hair, which is continuous with that over the mons veneris. They are abundantly supplied with sebaceous and sudoriferous glands. They lie in contact, and their inner surfaces present a smooth, moist surface, somewhat resembling mucous membrane. The apposition of the labia majora, slightly separated above by the labia minora and clitoris, forms the cleft of the vulva, or rima pudendum. In each lip is found a sac-like structure, known as the dartoid, which is analogous to the same structure in the scrotum of the male. In this dartoid sac terminates the round ligament, and in the fetus an open canal, called the canal of Nuck. In rare cases the latter remains open in the woman and permits the development of hydrocele. Generally, within these

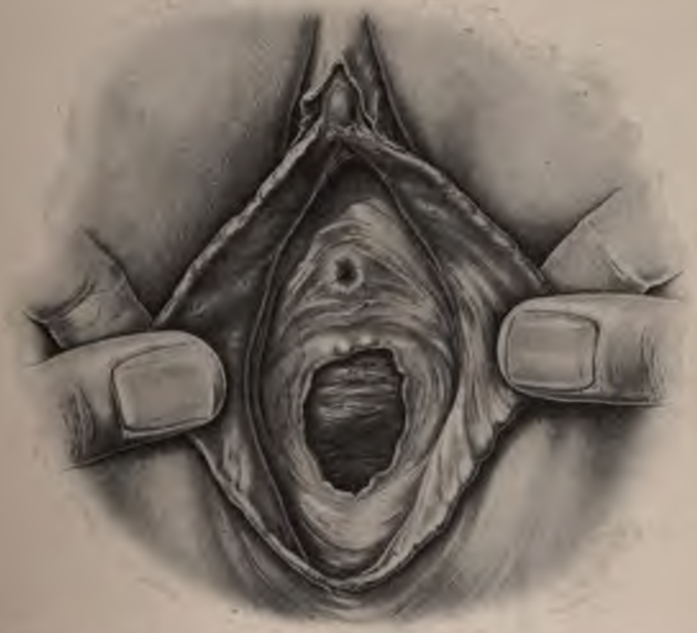


Fig. 95.—Virgin Vulva; Labia Separated, Showing the Hymen Unruptured. —(*From Deaver.*)

folds is contained a large quantity of adipose cellular tissue, especially in fat subjects.

183. **The labia minora,** especially exposed upon separation of the labia majora, are two folds of fine skin which lie between the labia majora, becoming much more prominent anteriorly. When widely separated, they are recognized as continuous with the fourchet, or what is generally called the posterior commissure. Anteriorly, they bifurcate, forming two folds—an anterior, which passes above the clitoris and forms its prepuce or hood, and a posterior, which runs beneath the glans clitoris and forms the frenulum. The surfaces of the nymphæ are smooth or slightly roughened, with free convex, sometimes notched, borders. Occasionally, small openings will be found. The dimensions of the nymphæ vary greatly according to the age and race. In the new-born child they project to a considerable extent beyond the labia majora; as puberty occurs, the labia majora become larger and the labia minora are not so visible. In some individuals, particularly the Bushwomen, the labia minora become very long, and extend to the knees, when the condition is known as the Hottentot apron. The skin is covered with a stratified pavement epithelium similar to the true epidermis. Sebaceous glands are quite plentiful, especially at the base of the folds, and form a very crowded layer upon the inner surface. The folds of skin contain a small amount of connective tissue. During the act of coition the labia draw the glans clitoris against the male organ.

184. **The Clitoris.**—The clitoris is an erectile organ having its origin from the ischiopubic rami on either side in the crus clitoridis, or corpus cavernosum, similar to that of the male organ. These crura converge at the level of the symphysis to form one body, which is supported from the symphysis by a suspensory ligament and the ischiocavernosus muscle, in which it resembles the penis. The corpora cavernosa are surrounded by a fibrous investment and separated by a median septum of cavernous tissue of fine trabeculæ, in which the muscular element is very abundant. The free extremity of the clitoris appears at the anterior part of the vulva, about half an inch behind the anterior extremities of the labia majora, and surmounted by a median tubercle, covered by the prepuce, derived from the nymphæ, or labia minora. This tubercle is known as the gland of the clitoris. It is imperforate, and generally is but slightly developed. When it appears enlarged, the other parts of the vulva will generally be found small and ill developed.

185. **The Vestibule.**—The clitoris forms the upper angle of a triangular space, situated between the labia minora, the base

of which is the anterior border of the vagina. This space is known as the vestibule. In its center, near the posterior border, is a rounded, pouting orifice, known as the meatus urethræ externus. The ducts of two clusters of large mucous follicles open on the surface of the vestibule. One group lies immediately behind the clitoris, the obstruction of whose ducts forms a cyst; the other group is behind, near the sides of the meatus. These follicles secrete mucus very freely under any persistent local irritation. In the virgin the vestibule presents a grooved ridge, which, according to Pozzi, represents the corpus spongiosum of the male, and is known as the vestibular band. The meatus urethræ is situated in the vestibule, just behind the clitoris and immediately in front of the orifice of the vagina. It generally presents a longitudinal or starred slit, the borders of which are slightly notched and projecting. Its mucous membrane sometimes bulges, forming a ring-like margin. On each side of the elevated margin of the meatus, and slightly posterior, is a minute opening, which usually is not easily detected in healthy subjects; but after gonorrhea or leukorrhea it may be readily recognized. These orifices are the openings of Skene's ducts, which extend

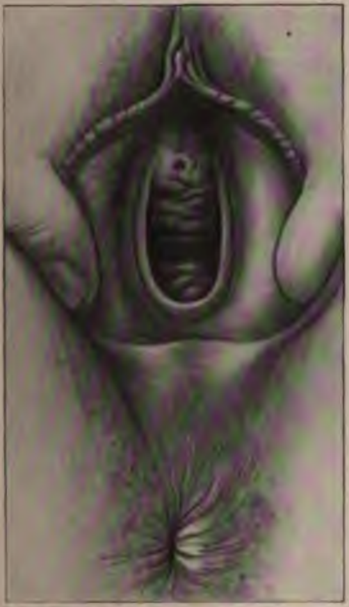


Fig. 96.—Hymen Crescens.

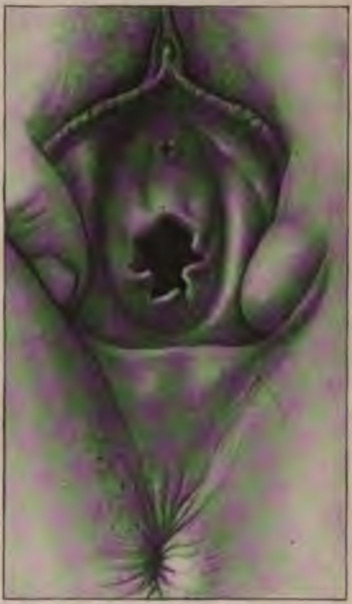


Fig. 97.—Hymen Annularis.

two centimeters on either side of the urethra. They should be recognized, as they occasionally become so large that a catheter may enter one of the canals instead of the orifice of the urethra.

186. The Hymen.—Separation of the labia minora reveals a thin membrane, known as the hymen. It is a sort of diaphragm, interposed between the internal genital parts on the one side, and the external parts and orifice of the urethra on the other. Its external surface resembles the structure of the labia minora, while the internal surface not infrequently has extending to its margin the rugæ of the vagina. In the undisturbed state the hymen is a vertical slit with its edges in contact. The opening is usually crescentic, with the concave margin anterior. Occasionally, it is annular, with a central opening. There are a number of different varieties of opening to the hymen, such as the labiaform, in which the lateral folds are sometimes mistaken for the labia minora; the hymen linguaformis, in which there is a tongue-shaped projection posteriorly; the falciform, in which the orifice is long and somewhat wide and the membrane is narrow. The free edge of the hymen is perfectly smooth or may be denticulated. The structure may be thick

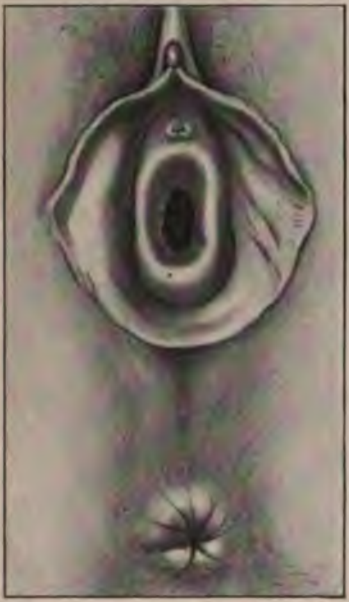


Fig. 98.—Hymen Infundibularis.

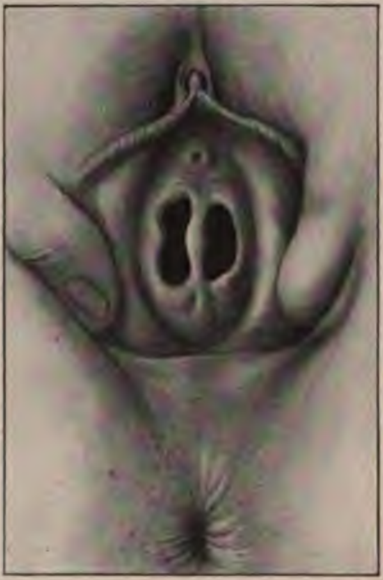


Fig. 99.—Hymen Biseptus.

and fleshy, while it presents at the margin thin, irregular folds. These folds, in rare cases, resemble fimbriæ. In the infundibular form of the hymen its edge looks downward and outward, and presents a funnel-shaped appearance. Occasionally, there are two openings, the septus or biseptus; or a number of small apertures, the cribriform hymen. The structure of this membrane is usually thin and easily torn, but occasionally it is so firm that it will resist the most violent efforts at coition, and requires incision of the hymen before the sexual act can be completed. A rupture of the hymen usually occurs with the first coition, and occasionally this rupture is attended with profuse, and often dangerous, bleeding. After labor the greater portion of the hymen is destroyed, and shrinks together, to form small masses at the vaginal outlet, known as the carunculæ myrtiformis. The number, form, and situation of these caruncles vary extremely. Most frequently there are three. One occupies the posterior part, the other two the sides of the entrance to the vagina. The two surfaces of the hymen are covered with pavement epithelium. It guards the entrance to the vagina.

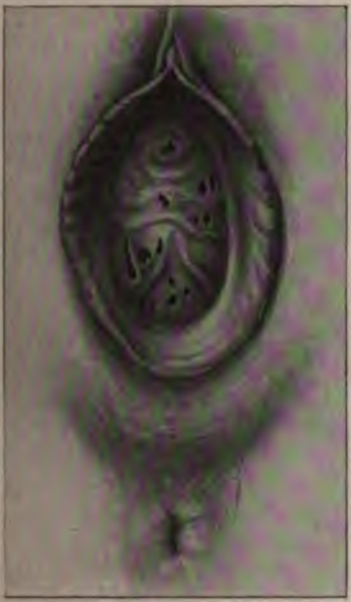


Fig. 100.—Hymen Cribriformis.

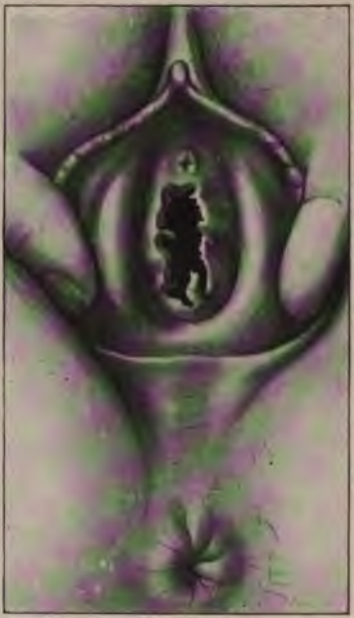


Fig. 101.—Hymen Serratus.

187. The Fourchet.—Separation of the vulva shows posteriorly a continuation of the labia minora in the form of a thin fold, which is known as the fourchet. Immediately within this fold, between it and the hymen, is a boat-shaped depression, known as the fossa navicularis, formed by the separation of these parts. The anal opening is situated four centimeters behind the fourchet. The intervening space is covered over with integument, and is known as the perineum.

188. The Muscles of the Perineum.—Dissecting off the skin, superficial fascia, and layer of the deep fascia we expose what are known as the muscles of the perineum. These muscles, on each side, are: The *erector clitoridis*, which arises from the anterior margin of the rami of the pubes and ischium, and is inserted by two tendinous expansions, one above the junction of the crura, to form the clitoris, and one somewhat below in front. The *bulbo-cavernosus* muscle arises from the perineal body and its anterior aponeurosis and is inserted by a thin slit in the crus of the same side, in front of the adjoining erector muscle; its outer portion winds inward, under the former, into the upper part of the bulb near its isthmus. Some of the median fibers are apparently derived from the sphincter, pass upward to the clitoris, and on the pubes are lost in the superficial fascia. Some of the fibers form a delicate muscular arch in front of the body of the clitoris. The *transversus perinei* muscles arise from the tuberosity of the ischii on each side, and are attached to the anterior aponeurosis of the perineal septum, the perineal body, and the skin of the perineum in front of the anus. The principal muscle of the pelvic floor is the levator ani muscle. It arises from the back of the body and horizontal ramus of the pubes, the pelvic fascia (white line), and the spine of the ischium. From these sources the muscle sweeps downward and inward, and is attached in the middle line, from before backward, as follows: to the vagina, to the rectum, to its fellow of the opposite side, and, finally, to the tip of the

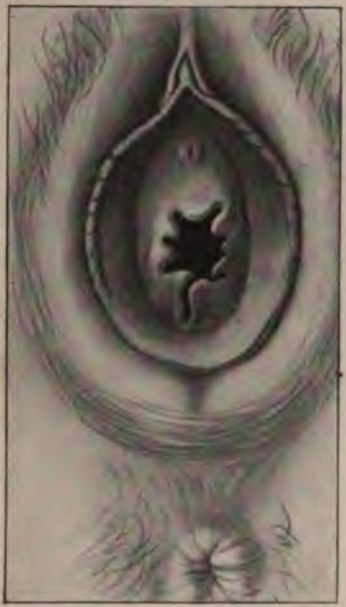


Fig. 102.—Laceration of the Hymen.

coccyx. The pubic fibers blend with the posterior half of the upper border of the sphincter vagina. This muscle is better exposed from above. In the same dissection is exposed a racemose gland on each side and posterior to the vaginal orifice, which is analogous to Cowper's gland in the male. It is known as the *vulvar gland of Bartholin*, or, as called by Hugier, the vulvovaginal gland. It is about the size of an almond, but varies in different individuals and even upon the two sides. Occasionally, there are glandular lobules, which seem detached from the gland and are scattered in the surrounding muscle. The gland is in relation to the vagina, to which it is adherent by tense cellular tissue, and externally lies beneath the constrictor muscle of the vagina. Its excretory duct, about one centimeter in length, is directed from below upward, from without inward, and opens upon the surface of the vulva in front of the hymen, in the angle between the latter and the wall of the vulva.

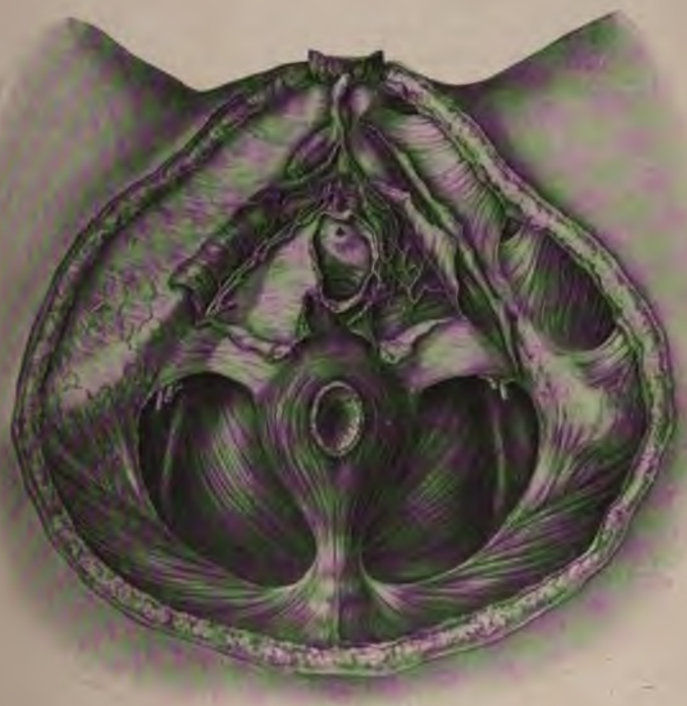


Fig. 103.—Muscles of the Female Perineum.—(*Deaver.*)

When the hymen is broken up, its orifice is found in the corresponding angle, between the caruncula myrtiformis and the wall of the vulva. It is usually difficult to detect, but occasionally presents an orifice that would admit a probe. This gland is the source of the secretion that takes place under sexual excitement or during coition. On each side of the vagina and extending forward is a venous mass, which is known as the *bulb of the vestibule.* It lies between the vagina, vestibule, and urethra, and the inner surface of the bulbocavernosus muscle. These two bulbs unite beneath the clitoris by the pars intermedia. The dimensions of the injected bulb, according to Kobelt, are nearly 4 cm. in length, 1 cm. in width, and in thickness from 0.9 cm. to 1.1 cm. Its external surface is convex, the internal surface concave. This bulb represents the corpus spongiosum of the urethra in the male, and is a part of the erectile tissue of the genital organs.

189. Perineal Fascia.—The fascia of the pelvic floor consists of:

1. The superficial fascia.
2. The deep layer of the superficial fascia.
3. The triangular ligament, composed of two layers.

The *superficial fascia* is a continuation of the general fascia of the body. It comprises two layers—an outer, more or less loaded with fat, which is continuous with the same layer over the buttocks, thighs, and abdomen; while, second, an inner or deep, more resisting membranous investment descends from the abdomen, narrowed to the width of the pubes, and spreads out, so as to cover in the anterior perineal triangle, to its base—the perineal septum. The fascia is firmly adherent through its abdominal portion with Poupart's ligament; by the perineal portion, to the outer margins of the ischiopubic rami and to the inferior margin of the septum; while the pubic portion is attached along a curved line of the bone which indicates the origin of muscles of the fore part of the thigh.

Upon each side of the vagina is a tubular prolongation from the margins of the external inguinal ring, extending backward nearly to the posterior vulvar commissure, which is known as the pudendal sac; and, with its fellow of the opposite side, when enveloped with their cutaneous coverings, the two sacs form the labia majora. The pudendal sac contains more or less fatty tissue, and the terminal fibers of the round ligament of the uterus are lost in it. This sac may become the seat of hydrocele, through a patulous canal of Nuck, or of hernia, through descent of the gut by the inguinal canal. Air injected into the sac gives an appearance similar to that induced by hernia. At the posterior margin the fascia passes around the transverse perineal muscles to join the anterior layer of the triangular ligament. This union forms what is known as the ischioperineal ligament—a very firm aponeurotic band attached to the outer ends of the rami of the ischii in front of their tuberosities.

The *deep fascia*, or *triangular ligament*, has two layers—an anterior, or superficial, and a posterior, or deep. The superficial is attached to the rami of the pubes and ischium, and to the so-called transverse ligament of the pelvis, which lies immediately behind the subpubic ligament, from which it is separated by an opening for the dorsal vein of the clitoris.

Posteriorly, it is united with the superficial, as well as with the deep, layer of the pelvic fascia. The deep layer is also attached to the rami of the pubes and ischium, and joins the obturator fascia covering the lower surface of the anterior surface of the levator ani muscle. In front, it is continuous with the vesicorectal fascia; and posteriorly, with the dense fascia (the anal fascia) which covers the under surface of the levator ani muscle.

The junction posteriorly of the three layers of fascia forms the ischioperineal ligament, which marks the boundary-line between the urogenital and anal regions.

The upper surface of the levator ani muscle is covered by a layer, known as the pelvic fascia, which is a continuation of the iliac. It is attached to the iliac part of the iliopectineal line and to an oblique line upon the posterior surface of the pubic bone, from above and within the obturator foramen, to just below the symphysis. It covers the inner surfaces of the ilium and ischium about halfway down the pelvic wall until it reaches the so-called tendinous arch, which extends from the spine of the ischium to the pubic bone and below the obturator canal. This portion covers the obturator muscle, and is known as the obturator fascia. A thinner prolongation extends backward, and is known as the pyriform fascia.

The pelvic fascia splits into two layers at the tendinous arch—an upper, called the vesicorectal fascia, which extends over the levator ani muscle, and a lower layer, which follows the obturator internus muscle to the inner edge of the ischiopubic branches, and retains the name of obturator fascia. Below the insertion of the levator ani muscle this fascia gives off an investment, known as the anal fascia. In conjunction with the portion of obturator fascia below the tendinous arch it serves as a lining for the ischiorectal fossa.

The vesicorectal fascia, from its insertion upon the pelvic wall, passes inward and downward and covers the upper surface of the levator ani to the base of the bladder, the vagina, and the rectum.

Near the middle line, in front, a thicker, narrow part of this fascia forms the anterior true ligaments of the bladder, or pubovesical ligaments.

A *ligament of the rectum* arises from the ischial spine and is attached to the side of the rectum. It presents a double layer of fascia with intervening loose connective tissue, and permits a sliding movement of one part over another.

A study of the relations of the pelvic structures to the layers of the fascia results in the following, according to Hart and Barbour:

Between the skin and superficial fascia:	Superficial hemorrhoidal vessels and nerves. Superficial perineal artery and nerve.
Between the deep layer of the superficial fascia and the anterior layer of the triangular ligament:	Transversus perinei. Bulbocavernosus. Erector clitoridis. Transverse perineal blood-vessels and nerves. Venous plexuses. Bulbs of the vagina. Pudendal sacs. Dorsal artery and vein of clitoris.
Between the layers of the triangular ligament:	Compressor urethræ. Vagina, in part. Urethra, in part. Pudic vessels and nerves.

190. Pelvic Diaphragm.—The structures already described as the soft parts, consisting of the pelvic fascia and the musculature structures, constitute the pelvic diaphragm, of which the most important structure is the levator ani.

The origin and insertion of this muscle have been given. It is generally described as two muscles, the levator ani and the coccygeus, but as there is practically no separation, this seems an unnecessary distinction. Savage divides it into three, the pubococcygeus, the obturator coccygeus, and the ischiococcygeus, but this division seems inappropriate when we recognize the fact that none of the muscular fibers arising from the pubes reach the coccyx. The anterior portion of the muscle is covered by the muscles and structures of the external genitalia. The posterior portion is enveloped with the fascia and covered with the following additional layers: the skin; the adipose tissue filling up the ischiorectal fossa, and known as the ischiorectal fat. The boundaries of this irregular triangular space are the levator ani, covered by the anal fascia on the inner side, and the obturator internus muscle, covered by the obturator fascia, upon the outer side. The lower surface is bounded by the anterior edge of the gluteus maximus muscle and the greater sacrosciatic ligament behind, the transversus perinei muscle in front, and the sphincter ani upon the inner side. The apex of the triangle is at the spine of the ischium. Behind, the two fossa communicate through loose adipose tissue back of the rectum, and through the pelvic fascia. In front, the fossa is limited by the line of junction of the superficial and the deep fasciæ.

The posterior fibers of the levator ani pass behind the rectum and are continuous with those of the opposite side. Other fibers are attached to the tip and side of the coccyx.

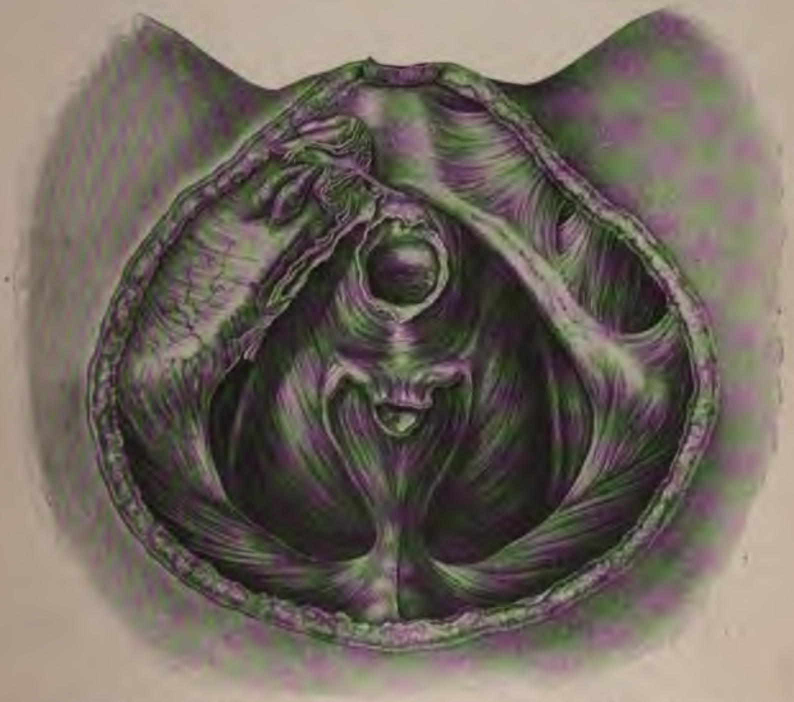


Fig. 104.—The Under Surface of the Levator Ani Muscle.—(*Deaver.*)

Action.—The pelvic diaphragm strengthens the pelvic floor, and, in association with its two enveloping layers of fascia, forms a strong support for the uterus and bladder. Observation of the movements of the floor, with the employment of Sims' speculum, reveals a rhythmic movement synchronous with respiration. The anterior pelvic segment goes downward and backward during inspiration and upward and forward with expiration. The muscle serves to raise up the rectum during defecation and draws the anus toward the symphysis. The fibers between the rectum and vagina influence the size of the vaginal orifice.

191. Perforations.—The pelvic floor is perforated by three slit-like openings, two of which, the vagina and urethra, have axes parallel with the conjugate diameter of the brim. The rectum for a part of its course is similar, but turns backward at the lower part, where it is separated from the vagina by the perineal body. The axis of the anus is at right angles with the plane of the brim. Transverse section of the pelvis through the middle and lower third of the vagina shows it folded in the shape of a letter H, with a short lateral and a long transverse bar. The urethra presents a vertical slit, and the rectum is similarly folded.

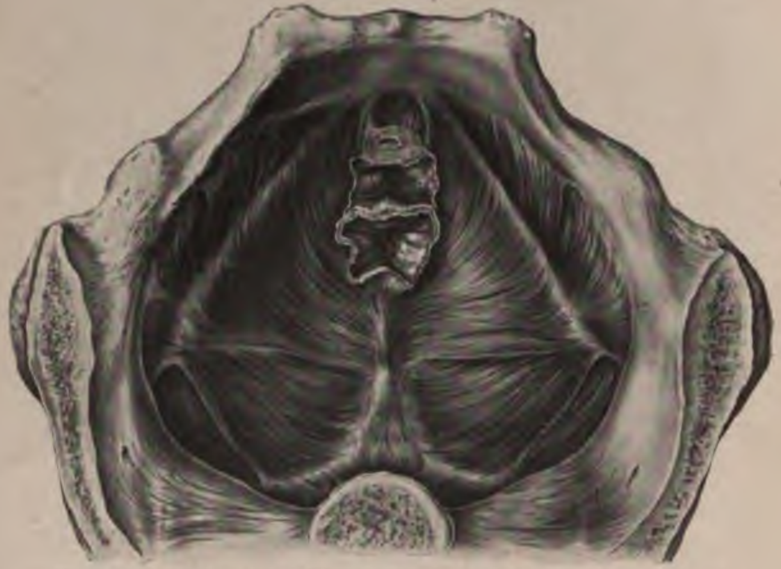


Fig. 105.—The Upper Surface of the Levator Ani Muscle.—(*Deaver.*)

192. Internal Genitalia.—The internal genitalia are: The vagina, the uterus, the Fallopian tubes, the ovaries, and the parovarium.

193. The vagina is a musculomembranous canal lying between the bladder and the rectum, and extending from the vulva to the uterus. It is fixed below by its attachments to the pelvic floor, and above surrounds the cervix, with which it is continuous. The direction of the vagina varies with the position and the condition of the adjoining organs—the bladder and the rectum. In the erect position it forms an angle of about 60 degrees with the horizon, and is parallel with the conjugate diameter of the brim of the pelvis. Its walls are irregularly triangular, with the widest point at the upper part, where the uterus enters, which in the nullipara measures 3 or 4 cm.; in multi-

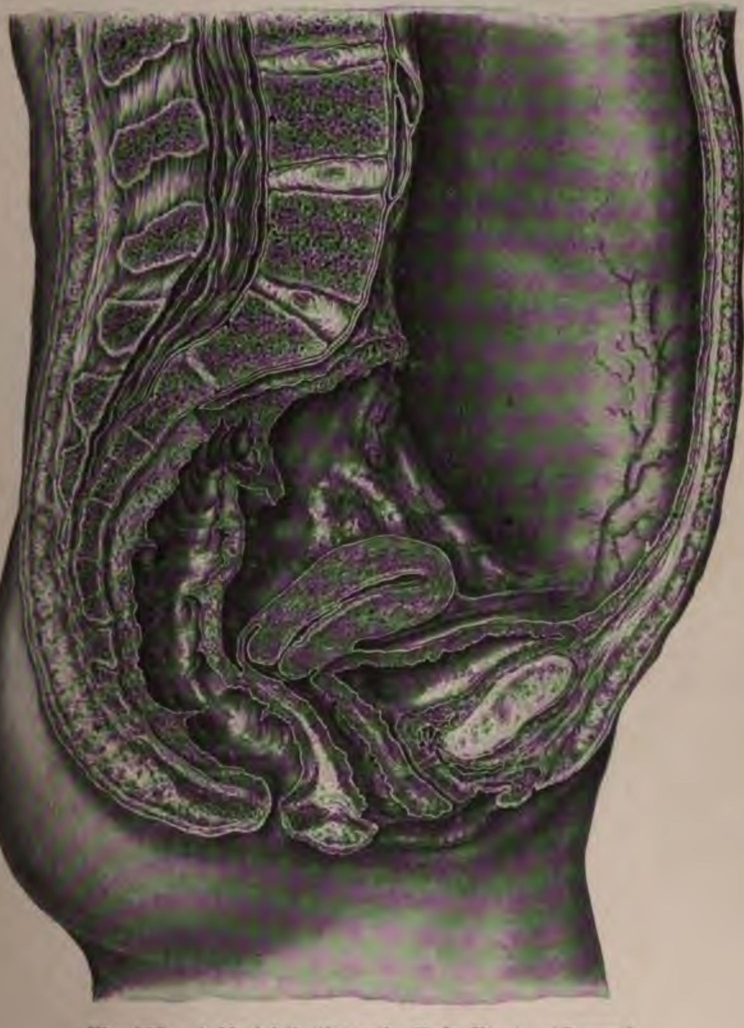


Fig. 106.—A Mesial Section; the Body Erect.—(*Deaver.*)

para, 6 or 7 cm. The anterior wall is the shorter, 5 cm. long, while the posterior is 7.5 cm. In the normal condition and

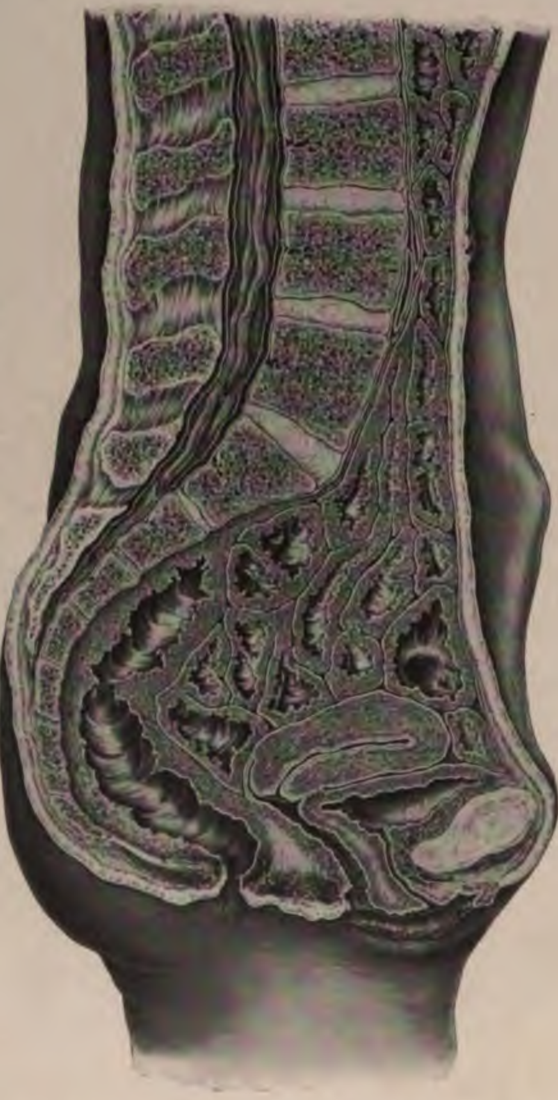


Fig. 107.—A Mesial Section; the Body Recumbent.

with the bladder empty, the cervix enters the vagina at a right angle. This angle is rendered more obtuse by distention of the bladder or by an accumulation of feces within the rectum.

The vagina is attached to the cervix about 1.5 cm. from the external os, and forms with the cervix a sulcus front and back. The former is known as the anterior, and the latter as the posterior, vaginal fornix. The anterior and posterior vaginal walls lie in contact, and, upon mesial section, present a slit with a slightly convex line directed anteriorly. Transverse section is represented by an H-shaped slit, the lateral arms of which are convex upon their inner aspect and the horizontal limb bending slightly anterior.

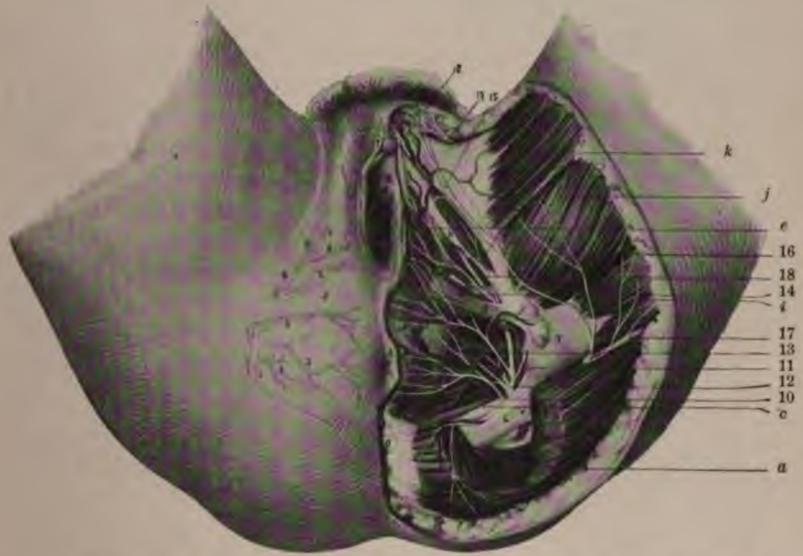


Fig. 108.—Arteries and Nerves of the Female Perineum.—(*Savage.*)

1. Internal pudic. 2, 3. Inferior hemorrhoidal. 4. Transverse perineal. 5. Superficial perineal or vulvar. 8. Artery of the bulb. 7. Profunda branch to the clitoris. 9. Dorsal artery to the clitoris. 10. Inferior hemorrhoidal nerve to sphincter and lower rectum. 11. Posterior superficial. 14. Anterior superficial branches to the vulva. 13. Trunk of the nerve. 12. Posterior muscular. 15. Anastomotic. 16. Pudendal branch of (17) the smaller sciatic. 18, 18. Continuation of pudic ending in nervous sheath for the clitoris. 19. Outer terminal branch of the ilio-inguinal nerve. A. Anus. M. Urinary meatus. C. Clitoris. L. Greater sacrosciatic ligament. V. Vagina. O. Coccyx. *A.* Gluteus maximus. b. Superficial sphincter. *c.* Anterior edge of ischio-coccygeus. d. Superficial transverse muscle. *e.* Bulbocavernosus muscle. *f.* Slip of anterior aponeurosis of perineal septum. *g.* Upper portion of erector clitoridis muscle. *j.* Adductor magnus. *k.* Gracilis muscle. T. Nerve-fibrils to integument.

The vagina in multiparæ is capable of wide distention, and is of quite variable shape. The anterior vaginal wall is united with the posterior surface of the bladder by loose connective tissue, which permits its dissection, though separation rarely occurs. The urethra is so intimately associated with this wall that it is not readily dissected from it.

The mucous membrane of the anterior wall is thrown into numerous folds or projections, called the rugæ, which are more marked toward the vulva and decrease in size as the upper end of the canal is approached. There are also temporary foldings, which disappear as the vagina is distended. The rugæ consist of a series of transverse ridges, which extend obliquely upward and outward from the longitudinal stem, known as the anterior column.

The transverse projections are composed of secondary ridges, covered with papillæ. The anterior column generally begins behind the meatus and disappears in the upper third of the vagina; occasionally, its lower portion is divided into two parts by a longitudinal groove, the opposite halves of which subsequently unite. The rugæ are especially marked in young children and virgins, and largely disappear in the multipara. The posterior wall also presents a column with transverse rugæ, but less marked than upon the anterior.

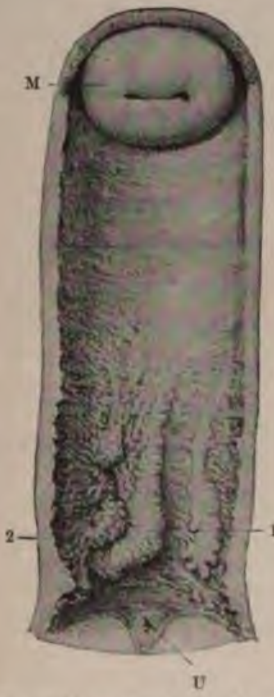


Fig. 109.—Anterior Wall of Vagina Showing Columnæ Rugarum.—(*Byford, after Savage.*)

1, 2. Anterior columns of the vagina. U. Urethral orifice. M. Cervix.

The upper part of the vagina presents, when distended, a dome-like appearance, in which the posterior fornix is twice the depth of the anterior, owing to the higher attachment upon the cervix. The lateral fornices have no especial depth, and only connect the anterior and posterior. As the patient advances in years the vaginal walls atrophy and the rugæ gradually disappear.

The wall of the vagina consists of three layers: an external connective-tissue layer; a middle, of unstriped muscular fiber; and an inner, of mucous membrane. The exterior layer binds the uterus to the surrounding structures and supports the plexus of vessels and lymphatics. The muscle structure is regarded as comprising longitudinal and circular fibers, intricately interlaced. A bundle of striated muscle-fibers is described by Luschka as surrounding the lower end of the vagina as well as the urethral orifice, which he calls the sphincter vaginæ.

The mucous membrane, extending from the free edge of the hymen to the cervix, over which it is reflected to the internal os, varies in thickness from 1 to 1½ mm. It is of a rosy-red color, but may vary from a light pink to a dark purple or slate-color, the latter of which is especially characteristic of pregnancy. The mucous membrane is closely attached to the subjacent muscular layer, and is thrown into the already mentioned rugæ. The surface is covered with numerous papillæ, which are greatly increased by pregnancy.

The mucous surfaces are covered with an acid mucus, which is greatly increased during pregnancy.

The thickness of the vaginal wall is greater below, where it is about one centimeter, while at the upper part it is not over five millimeters. The difference in thickness is due to the variation in the muscular wall.

A microscopic section of the vaginal wall presents an external layer of fibrous tissue, enveloping large veins, which belong to the vaginal venous plexus. These are so surrounded by bundles of smooth muscle-fibers as to suggest erectile structure. Accompanying the veins are large lymphatics, some of which are distended to form sinuses. Within this is a muscular layer, in which the outer fibers seem divided transversely; the inner ones are longitudinal.

The mucous membrane consists of a firm basement membrane in which are numerous elastic fibers, and is covered by several layers of stratified pavement epithelium. In addition to the large folds into which the mucosa is thrown, it forms secondary elevations, or papillæ, in each of which is a capillary loop. These loops are single near the fornix, but present a more complicated network near the introitus.

The rugæ consist of large venous plexuses surrounded by bundles of muscle-fibers, as in cavernous tissue.

The lymphatics are abundantly supplied to the mucosa. Lauenstein has described lymph-follicles similar to those in the intestine.

The existence of mucous follicles or glands in the vagina is denied; the mucus is believed to be an exudation from the vaginal surface.

The nerves ramify throughout the walls, communicate with one another and with the ganglia, and terminate in end-bulbs beneath the epithelium.

194. The Uterus.—The uterus, or womb, is a hollow, thick-walled, muscular organ, of a truncated shape, which occupies the upper part of the cavity of the pelvis and projects by its cervix into the vagina. It is situated between the bladder in front and the rectum behind. The fundus is usually just below the level of the plane of the brim of the pelvis, and about two centimeters in front of the sacrum. The position of the uterus is dependent upon the condition of the surrounding organs. With the bladder empty and rectum undistended, the uterus is slightly anteflexed, and situated at a right angle to the axis of the vagina. The fundus looks forward and upward, and the cervix downward and backward, toward the rectum. A distended bladder raises the fundus and decreases the uterovaginal angle. A similar change of position is induced by accumulations within the rectum, which push the cervix forward. It necessarily becomes difficult then to determine between a physiologic and a pathologic position. We may say any position becomes abnormal when the organ becomes fixed and its range of mobility is lessened. The uterus, from above, presents a pear-shaped appearance, slightly flattened from before backward, and the posterior surface is the more convex.

The length of the virgin uterus is from 5 to 7.5 cm.; its breadth at the orifices of the Fallopian tubes, 5 cm.; and its walls are about 1 cm. thick. The weight of the nonimpregnated uterus is from about 300 grains to 1½ ounces. The organ is divided into two portions—the body and the cervix. The body, pyriform in shape, about 4 cm. long, is surmounted, above a line drawn through the orifices of the Fallopian tubes, by a rounded portion, which is called the fundus. The cervix, cylindric in form, is about 3 cm. long and terminates below in the vaginal portion. Schroeder divides the cervix into three parts: the upper and lower, called the supravaginal and infravaginal portions, which are separated by an intermediate portion—a division which is of significance in the recognition of uterine displacements.

The attachment of the vagina to the uterus is much higher behind. When the patient occupies the dorsal position, with the limbs well drawn up, the vagino-uterine junction is upon a plane vertical to the horizon. The infravaginal portion of the cervix is especially interesting to the gynecologist, as it is the only part of the uterus which is subjected to inspection, and which is fully accessible to palpation. It varies extremely in size and shape, according to the age and sexual relations of the individual. In the virgin it presents a conoid projection, nearly one centimeter long, with an opening in its apex, known as the external os, or os tincæ. The os is a transverse slit, about two or three millimeters long, which divides the cervix into an anterior and a posterior lip. The anterior lip is the longer.

With the advent of sexual activity the cervix changes. In the nulliparous married woman it becomes softer and larger, the conoid shape is less marked, and the os stands more widely open.

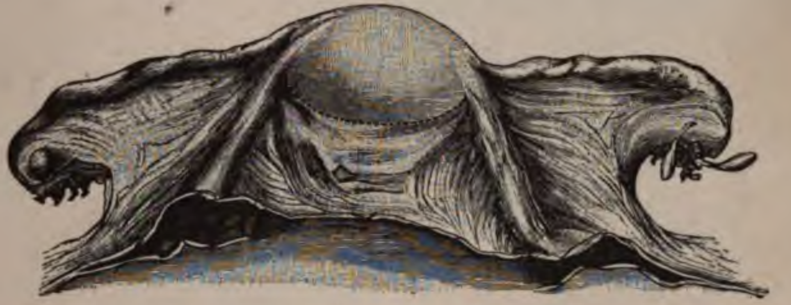


Fig. 110.—Curved Dotted Line Shows Covering of the Anterior Uterine Wall by Peritoneum.—(*Winter.*)

In the multipara, even when lacerations have not occurred, the cervix is large, soft, and the os presents a transverse slit, more frequently an irregular opening. Inflammatory lesions cause the cervix to become still larger, with eversions of the mucous membrane, erosion of the surface, enlargement of the papillæ, and an irregular opening.

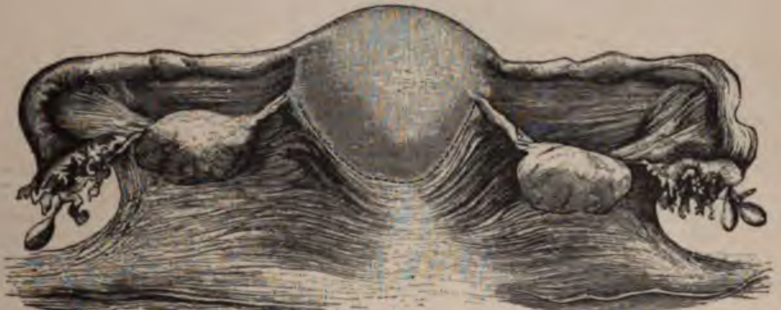


Fig. 111.—Posterior Surface of Uterus Showing Extent of Peritoneum; also Fallopian Tubes, Ovaries, and Ovarian Ligaments.—(*Winter.*)

With the cessation of menstruation, and especially in women who have borne a large number of children, the vaginal cervix disappears and the os is flush with the fornix of the vagina.

The body of the uterus lies above the isthmus. Its anterior surface is flattened; the posterior is quite convex. The upper border of the uterus is rounded, and forms the fundus. The lateral borders of the uterus are obscured by the folds of the peritoneum which are known as the broad ligaments. The upper part of each ligament is occupied by the Fallopian tube; below this, the round ligament; and still lower, the ovarian ligament.

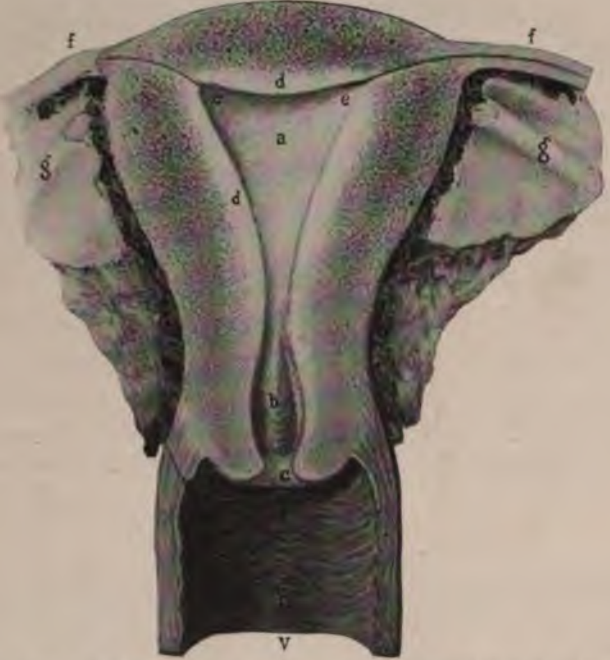


Fig. 112.—Median Section of Uterus from Side to Side through the Fallopian Tubes. Mode of Junction of Vagina and Uterus.—(*Savage.*)

a. Uterine cavity. b. Cervical canal, showing folding of its mucous membrane. d. Internal uterine (mucous) coat. c. Os externum uteri. e. Uterine aperture to Fallopian tube. f. Fallopian tube near uterus. g. Round ligament. V. Vagina.

The arteries, veins, lymphatics, and nerves enter and leave through the broad ligament.

The uterine canal in the virgin is about five centimeters; slightly longer in the multipara. The cavity of the cervix is cylindric, wider in the center and narrower at each end, which forms the external os below and the internal above.

The cavity of the body is triangular, from side to side, but the anterior and posterior surfaces lie in contact. At the apex of each angle of the triangle is found an opening; on each side, the orifices of the Fallopian tubes; below, the internal os.

The wall of the uterus has a thickness of a little more than one centimeter. The uterus has three layers—an external (serous), a median (muscular), and an internal (mucous membrane). The serous or peritoneal covering is not complete, and will be considered with the peritoneum.

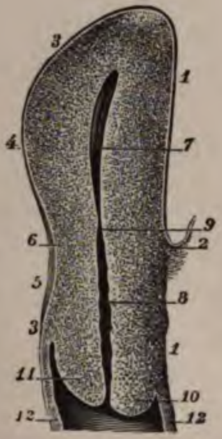


Fig. 113.—Virgin Uterus, Median Section.—(*Byford, after Sappey.*)

1. Anterior surface. 2. Vesico-uterine pouch. 3, 4, 5, 6. Posterior surface. 7. Cavity of corpus. 8. Cavity of cervix. 9. Os internum. 10, 11. Vaginal portion of cervix 12. Vagina.

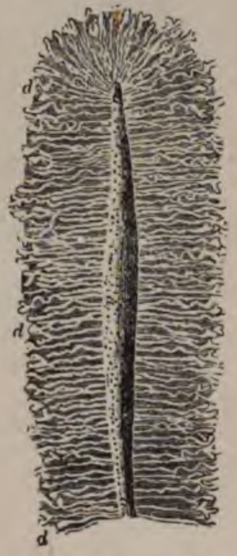


Fig. 114.—Mucous Membrane of Uterine Body Showing Follicles.—(*Mann.*)

d, d, d. Simple or double culdesac of these follicles. *a, a, a.* Thin cup-shaped orifice upon the mucous membrane.

The muscle-fibers are best studied in the pregnant uterus, and may be divided into three layers. The external is most distinct, as a fine, thin layer over the anterior and posterior surfaces, from which prolongations are sent off into the broad ligament. The posterior fibers form the ovarian ligament, and the anterior the round ligament. Some of the fibers also furnish the longitudinal fibers of the Fallopian tube. These fibers are wanting upon the sides of the uterus. The middle layer is by far the thickest, and consists of interlacing fibers, transverse and longitudinal, which are continuous with those of the vagina. This layer comprises the principal part of the wall, and contains the blood-vessels. The latter are embedded in a network of fibers, and may be recognized with the naked eye upon cross-section. Their intimate relation to the muscle and tissue is recognized by their remaining open when divided transversely.

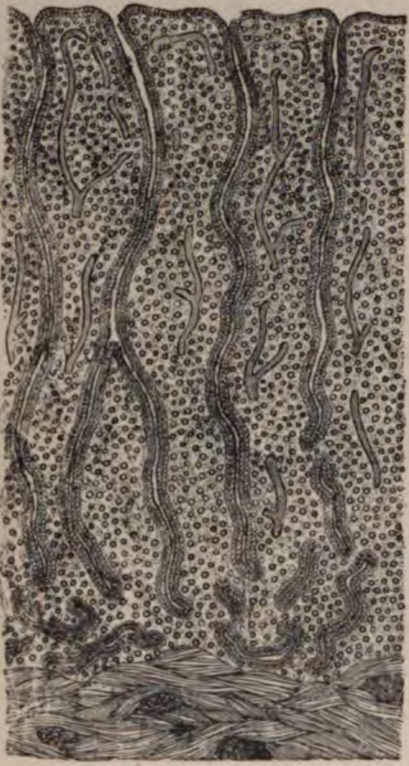


Fig. 115.—Microscopic Section Showing Utricular Glands Penetrating Mucous Membrane.—(*Wyder.*)

The inner layer consists of circular fibers, which are most marked at the internal and external os, where they form a sort of sphincter, and at the cornu of the uterus, from which they are extended upon the Fallopian tubes.

The connective tissue of the uterus is thickly interspersed between the muscle-fibers, and especially along the course of the vessels. The mucous membrane of the uterine cavity rests directly upon the muscle layer, without any intervening submucosa, and its glandular structure projects between the muscle-fibers. In the cervical cavity, where the mucosa is thrown into folds, a distinct areolar layer intervenes between it and the muscular wall. The uterine mucosa is one millimeter in thickness at the fundus, but becomes thicker near the center of the cavity. It is smooth and velvety, of a grayish-red color, and presents no folds, unless in the immediate vicinity of the tubal opening, and there but a slight folding. Under a glass can be seen numerous small depressions or openings—the orifices of the glands. The free surface of the mucosa is covered with a single layer of columnar epithelial cells, which are supplied with cilia. The mucosa is filled with glands of the tubular variety, which penetrate its entire thickness, and frequently their external extremities are embedded in the muscular layer. The direction of these tubules is more or less oblique. They often exist as sinuous or spiral single tubes, but more frequently divide into two or more branches near their lower ends. Upon longitudinal section they exhibit a basement membrane lined by a single layer of prismatic ciliated cells with single large nuclei near their bases. These glands largely increase with the approach of puberty, and become elongated during menstruation, and especially in pregnancy. The mucosa is supplied with large plexuses of capillaries and lymphatics. The latter, in the form of lymph-spaces, are directly connected with the lymph-sinuses and vessels of the deeper layer. The termination of the nerve-filaments in the mucosa has not been determined, but the action of the glands indicates their reception of nerve-filaments, as in similar structures of other parts of the body.

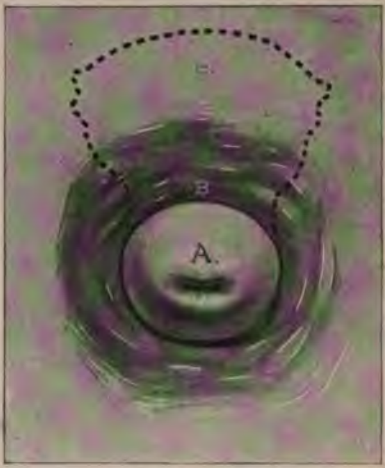


Fig. 116.—Virgin Os and Cervix.—(*Sappey.*)

The cervical mucosa is thicker than that of the body, is thrown into folds,—the arbor vitæ, or plicæ palmatæ,—and is separated by a submucosa from the muscular wall. This arrangement of the mucosa ends sharply at the internal os, and is best observed in the virgin cervix. The mucosa differs from the lymphoid structure of the body in having a firm, fibrous basement membrane, surmounted by cylindric epithelial cells. These cells, according to De Sinety, are ciliated only upon the summit of the ridges, while the epithelium covering the intervening surfaces is nonciliated. The glands are of the racemose variety, consisting of branching ducts. They are lined with nonciliated cuboid epithelium, resting upon a structureless basement membrane. They open upon the free surface, upon and between the folds, and secrete a clear, viscid, alkaline mucus. The ovula Nabothi are those glands which have formed small cysts after occlusion of their ducts.

The structure of the cervical wall differs from that of the body in the increase of fibrous tissue, which is intimately interwoven with the muscle-fiber, and in the lessened supply of blood-vessels.

The external os presents a sharp line of demarcation between the one-layered cylinder epithelium of the cavity and the multiple-layered pavement epithelium of the vaginal portion.

195. **Fallopian Tubes.**—The Fallopian tubes, or oviducts, are tortuous canals, one of which arises on each side of the fundus uteri. They vary in size and length, occupy the upper margin of the broad ligament, and extend outward almost to the pelvic brim. The length of the tube is from 7.5 cm. to 12.5 cm., the right tube usually being the longer.

They are first directed outward, then backward, and finally inward, giving the appearance of a shepherd's crook. The tube is divided into the isthmus, the ampulla, and the fimbriated extremity. The isthmus is the narrowest part, and represents that portion immediately in association with the uterus, which is about two centimeters long. Its diameter is about two millimeters and its lumen will scarely admit a bristle. The ampulla is the more widened part; it extends outward and backward, has an external diameter of from six to eight millimeters, and its lumen a diameter of two or three millimeters.

The fimbriated extremity—also called the pavilion, or infundibulum, from its funnel shape, and the morsus diaboli (devil's mouth)—is a funnel-shaped opening, surrounded by primary and secondary fimbriæ, which resemble the tentacles of the sea anemone. The primary fimbriæ are the larger processes, four or five in number, from which arise the eight or ten secondary processes.

The longest fimbria (fimbria ovarica) anchors the tube to the ovary and has a furrowed groove, which facilitates the passage of the ovum to the tubal orifice. The broad ligament is continued to the lateral wall of the pelvis by a small fibrous band, known as the infundibulopelvic ligament.

The tube, upon repeated section, will be found to have varying dimensions, and frequently its course is tortuous, almost convoluted. It has two openings—the uterine and abdominal ends. The latter is more distensible than the remaining portion of the tube, is somewhat funnel-shaped, and affords a communication with the peritoneal cavity.

The tube has three coats: the external, a serous; the middle, a muscular; and mucous membrane for the internal.

The external serous covering is incomplete, that portion of the tube toward the broad ligament being incomplete for the inner two-thirds of the tube. The remaining third is surrounded by the peritoneum, which covers the external surface of the fimbriæ, while the internal is lined by the mucosa. The muscular coat consists of longitudinal and circular fibers. The former is continuous with the outer, the latter with the inner, muscular layer of the uterus. The muscular structure is more largely developed at the proximal than at the distal end of the tube, and the circular fibers are particularly well marked at the isthmus, where they form what is called the sphincter tubæ. The tubal mucosa—quite thick, thrown into longitudinal folds, and very vascular—presents a bright red color. In the isthmus the mucosa presents simple folds, which become more complex in the ampulla. Hennig has counted from three to five primary folds, which have between eight and ten smaller plicæ between each pair of the former. The secondary folds are less marked near the abdominal extremity, where the longitudinal folding is apparent to the naked eye.

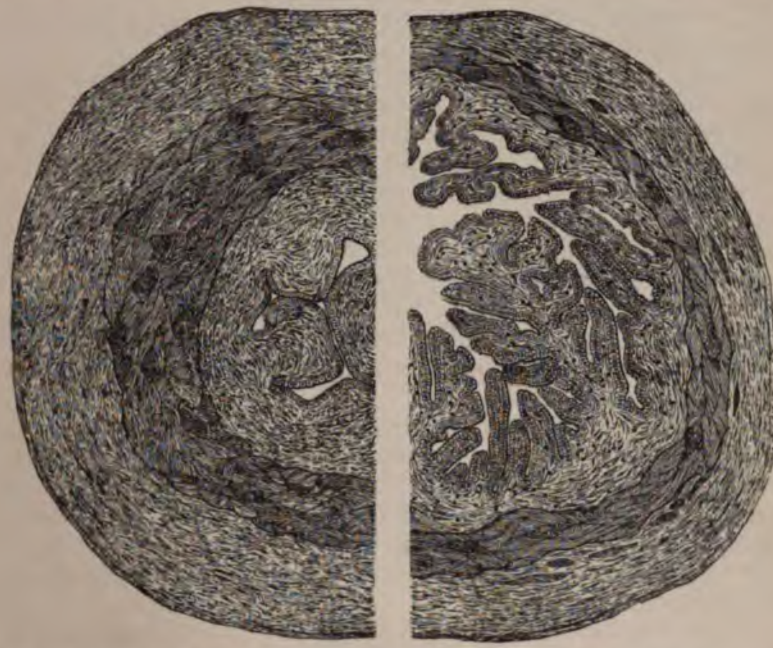


Fig. 117.—Section of the Fallopian Tube, First at the Isthmus, and, Second, through the Ampulla. The Latter Shows the Extensive Folding of the Mucous Membrane.—(*Wyder.*)

The mucosa has a single layer of ciliated columnar epithelium upon two or three layers of supporting cells, which are round or pyriform. The cells abruptly terminate at the ends of the fimbriæ, where the margin between the columnar and pavement epithelium is distinctly marked. The tubal mucosa, like the uterine mucosa, has no distinct submucous layer, is without glands, and is covered with a thin layer of grayish mucus of a distinctly alkaline reaction.

196. **Ovaries.**—The ovaries are the analogs of the male testicle, and are a pair of small bodies, situated one upon the posterior fold of each broad ligament, below the tube, at each side of the uterus.

The ovaries occupy a position at the level of the brim of the pelvis, or partly below and partly above its plane.

The axes of the ovaries lie obliquely to the pelvis, with a slight inclination forward. In the erect position they rest upon the posterior surface of the broad ligament.

Above the ovary, and partly encircling it, is the Fallopian tube, and in front, in the anterior fold of the broad ligament, is the round ligament. Somewhat in front of the ovary, between it and the tube, is the parovarian structure, or organ of Rosenmüller. The inner extremity of the ovary is connected with the uterus by some muscle-fibers, about three centimeters long, known as the ovarian ligament; the outer extremity, above, with the end of the tube through the fimbriæ ovarica, and below, with the infundibulopelvic ligament.

The ovary presents a flattened, ovoid appearance, with its broad end directed externally and the pointed end toward the uterus. Its size varies with the age of the individual, the functional activity of the organ, and the occurrence of menstruation or pregnancy. The ovary attains its greatest size about six weeks after parturition (Hennig), and never reaches its former size in the subsequent involution.

Following the menopause, it shrinks to one-half or one-third of its dimensions during active sexual life. Luschka gives its dimensions as: length, 4 cm.; width, 2.2 cm.; thickness, 1.3 cm. It weighs from 60 to 135 grains.

The color of the ovary is a pinkish-gray, somewhat darkened as menstruation approaches. Immediately after ovulation a dark swelling follows, due to the accumulation of blood. As absorption progresses the color changes, and the mass becomes yellow, and later presents only a whitish cicatrice. Before puberty the ovary is smooth, but subsequently it becomes irregular, from the cicatrices following repeated rupture of cysts, or nodular, from the presence of matured follicles that have failed to rupture. Following the menopause, the ovary becomes a pearly white, irregular, almost cartilaginous mass, about one-half or one-third its former size.

The ovary is situated upon the posterior surface of the broad ligament, with its pointed end connected with the uterus by the ovarian ligament. The ovary, by its pointed end, is directed toward the ligament, and its stroma extends inward upon the latter, while the external ovarian end is blunt and large. The posterior surface of the ovary projects through the peritoneum, and is uncovered by it. The union of the columnar epithelium of the ovarian surface with the pavement epithelium is readily recognized as a white line, and is called the white line of Farre.

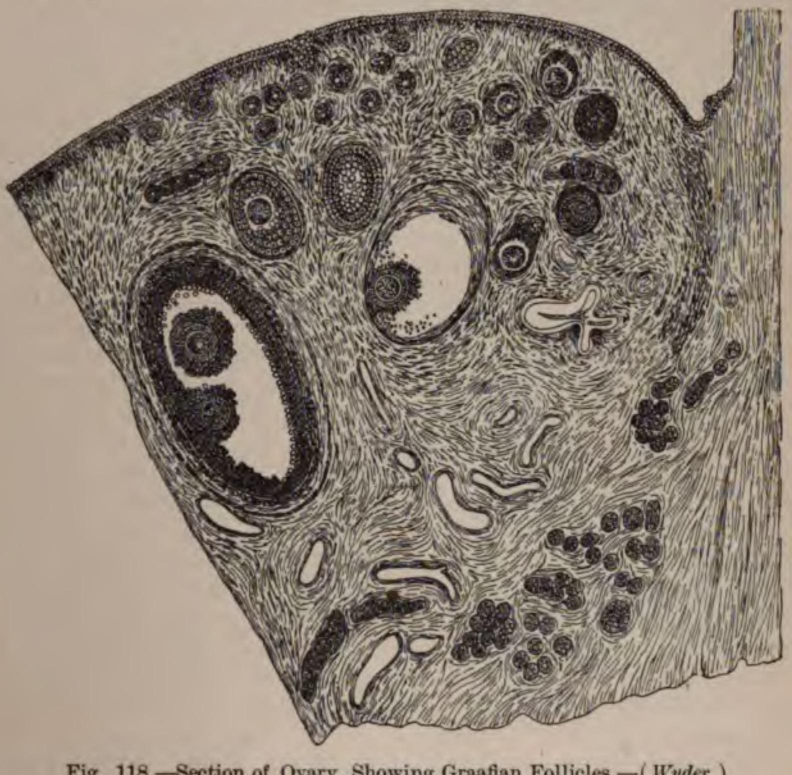


Fig. 118.—Section of Ovary, Showing Graafian Follicles.—(*Wyder.*)

Section of a healthy ovary shows two kinds of tissue—a central or medullary portion, and a cortical or peripheral portion. The central structure has a pinkish-gray or rosy color, is of soft consistence, and has a moist, glistening appearance, while the cortical layer is white or grayish-white, has a more or less firm consistence, and contains numerous small vesicles, the smaller of which are situated near the surface, while larger cysts are situated deeper. Some of these reach the size of a pea, and may project more or less beyond the free surface. The sac-wall is frequently so thin that the vesicles rupture under the slightest pressure. The cortical layer also contains numerous contractions, the result of repeated ovulation.

The external portion of the ovary, or that part which projects through the peritoneum, is covered by a single layer of short, columnar epithelium, called by Waldeyer the germinal epithelium. This terminates abruptly at the white line, and the pavement epithelium begins. Before puberty young ova are represented by large spheroid cells, with marked nuclei, which form in the columnar cells. Ingrowths of the germ epithelium into the underlying stroma are occasionally seen, which form the ovarial tubes of Pflüger.

Immediately beneath the epithelial layer, and quite inseparable from underlying stroma, is the tunica albuginea—a thin, dense layer of fibrous tissue, which contains a few smooth muscle-fibers. It is not completely developed until the third year, and undergoes changes with age and inflammation until it becomes thickened and of almost cartilaginous hardness, which renders its rupture exceedingly difficult. Such alterations from inflammatory changes are a cause of the formation of retention cysts, and of the development of that condition known as cystic disease of the ovaries. The structure of the ovary, as already noted, is divided into a cortical and a medullary portion, although they differ but little in structure except that the latter is softer and more vascular. In the cortical layer lie the Graafian follicles, embedded in connective tissue, interspersed with some muscle-fibers. Each ovary contains a large number of these follicles, which have been variously estimated at from 36,000 to 400,000 for each ovary. Whether so large a number exists is difficult to determine, but it remains evident that nature has amply provided for the reproductive function.

The ovarian stroma is the framework or bed in which the follicles rest and are nourished. Each Graafian follicle has a wall, which consists of a tunica fibrosa of thin fibrous tissue, within which is a more delicate membrane, called the tunica propria; the latter contains many granular cells and a fine network of capillary vessels. This tunica propria is lined with several layers of epithelial cells, called the membrana granulosa. These cells are separated from the tunica propria by a structureless membrane. These epithelial cells form a thickened mass upon one side, which projects into the cavity—the discus proligerus. The cavity of the follicle is filled with a clear, serous fluid, called the liquor folliculi. It is formed by liquefaction of the cells of the membrana granulosa.

The Graafian follicle, when mature, is one millimeter in diameter. Embedded in the discus proligerus is found the ovum, which has been called the typical cell; it measures from 0.2 to 0.3 mm. It is a yellow, spheroid body, enveloped by a thin, delicate membrane,—the vitelline membrane, or zona pellucida, doubtless formed from the innermost cells of the discus proligerus. Within this membrane is contained the vitellus, a network of granular, fibrillated protoplasm containing numerous fat-globules. In the outer portion of this network is a light spot, which consists of fine, fibrillated protoplasm, which contains in its meshes a granular material inclosed in a distinct membrane. This structure is known as the nucleus, or germinal vesicle. Within this is contained a small, highly refracting, granular body, known as the nucleolus, or germinal spot.

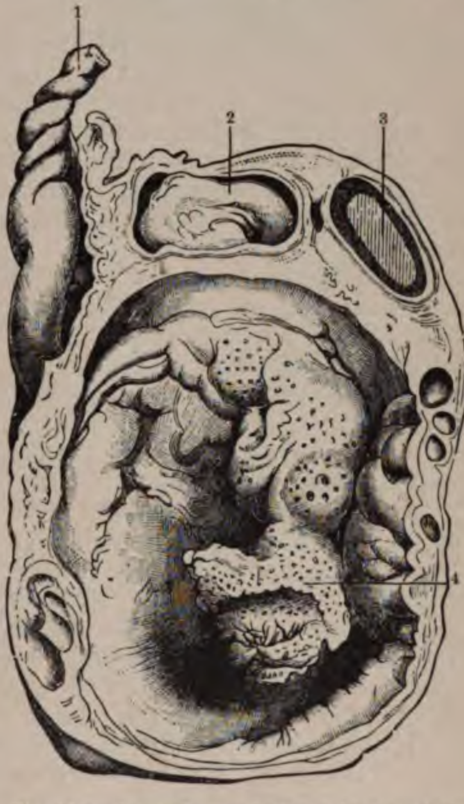


Fig. 119.—Large Corpus Luteum in Association with an Ovarian Dermoid. Removed from an Unmarried Woman Who Had Never Been Pregnant.—(*Sutton.*)

1. Twisted pedicle. 2. Corpora luteum. 3. Old clot. 4. Integumentary surface of dermoid.

The Graafian follicle is surrounded by a vascular network; as it matures, the liquor folliculi increases, the cyst becomes tense, approaches the surface, and the tunica albuginea becomes thinned and finally ruptures, permitting the ovum to escape. The cavity of the follicle fills with blood, which coagulates and forms a clot. Later, this clot presents an external yellowish color, while its center is of a reddish-gray hue. The clot gradually becomes organized, contracts (by which it is thrown into folds), and is gradually absorbed. The clot thus formed is known as the corpus luteum. The ovary of a normally menstruating woman will be found to contain a number of corpora lutea in various stages of retrogression. The structure generally disappears by the end of the twelfth week, excepting a small cicatrice, which remains.

When pregnancy occurs, the corpora lutea do not continue to form, but the one corresponding to the last menstruation becomes much larger and remains longer. It continues to increase, and after the first month forms a large yellow clot, which gradually becomes decolorized and more highly organized, resulting in a white, fibrinous clot surrounded by a yellow ring.

Later in the pregnancy, the time of which is not exactly known, it becomes contracted, and at its termination forms a mass about 0.5 cm. in diameter.

When the corpus luteum has lost its color and most of its blood-vessels, and is mainly composed of a mass of fibrous tissue, it is called a corpus albicans. Frequently, from the retention of pigment, it is dark in color, and is known as a corpus nigricans. Extravasations of blood, or apoplexy of the ovary, we shall see later, are not infrequent, and occasionally may result in the complete destruction of the organ and the formation of a blood-sac—an ovarian hematoma.

197. **The Parovarium.**—Between the outer end of the tube and the ovary is situated a triangular group of small tubules, known as the parovarium, or the organ of Rosenmüller—a remnant of the Wolffian body.

The structure corresponds to the epididymis in the male. The apex of the triangle is directed toward the ovary. This organ is of especial value to the gynecologist, as it can be the seat of a number of growths. It consists of from six to thirty spiral tubules, which at their base open into a single transverse tube. This transverse tubule corresponds to the canal of Gaertner in the lower animal. Cysts are frequently found associated with the tubules; the most common is the hydatid of Morgagni, the pedicle of which arises in a point of the mesosalpinx, near the fimbria ovarica. The parovarium is entirely a rudimentary structure, and has no function.

198. **Urinary Organs and Rectum.**—Our knowledge of the relations of the pelvic organs will be incomplete without a study of the analogy of the urethra, bladder, and ureters, as well as of the rectum and anus.

199. **The urethra** is a canal, from 2.5 cm. to 4 cm. long, which forms the outlet to the bladder, and lies embedded in the anterior vaginal wall. It is slightly curved upward, with its

concavity forward. Upon cross-section the urethra presents a transverse slit near its vesical end and a stellate folding toward the external meatus. The diameter of the urethra is 0.6 cm., and it is quite distensible. When not distended, the urethral mucous membrane is more or less corrugated throughout its length, owing to the sphincter-like action of the surrounding muscle-fibers. The urethra is attached to the pubic arch by the pubovesical ligament, and penetrates the triangular ligament, between the layers of which it is surrounded by the fibers of the compressor urethræ, or muscle of Guthrie.

It is also, together with the vagina, influenced at its lower end by the bulbocavernosus muscle. Its external opening is known as the external meatus, and close inspection of its orifice will reveal a number of small openings about it—the orifices of the glandulæ vestibulares minores. Within the meatus are two small openings—the orifices of the tubules, described by Skene. They correspond to the lacuna magna in the fossa navicularis of the penis.

They are described by Skene as tubules which extend for a distance of nearly one centimeter parallel with the urethra. From inflammation they can be so dilated that they will admit a No. 1 probe, and even the point of a catheter.

The urethral mucous membrane, like that of the vestibule, is of the pavement variety. The glands are lined at their mouths with the pavement epithelium, which soon changes into the columnar variety.

200. **The bladder** is situated in the anterior part of the pelvis, between the symphysis pubis in front, and the vagina and uterus behind. Its shape is constantly changing with the accumulation and evacuation of the urine. When empty, the urethra forms the stem of a Y, the anterior limb of which is the longer. Between the urethra, the anterior surface of the bladder, and the symphysis is a triangular space filled with the retropubic fat. The bladder, when moderately distended, becomes rounded; and when full, oval. The female bladder holds less than that of the male, and differs from it also in having the transverse diameter longer than the vertical. The bladder is divided into three portions: the body; the base, or fundus; and the neck. Skene defines the former as that portion which lies above a plane formed by the ureteric openings and the center of the symphysis pubis. The portion below is the fundus, or base, which includes the trigone, or space between the orifices of the ureters and internal meatus, and the bas fond, the space immediately behind the ureters. The thickened surface about the urethral orifice is the neck, which is the most dependent portion when the body is erect.

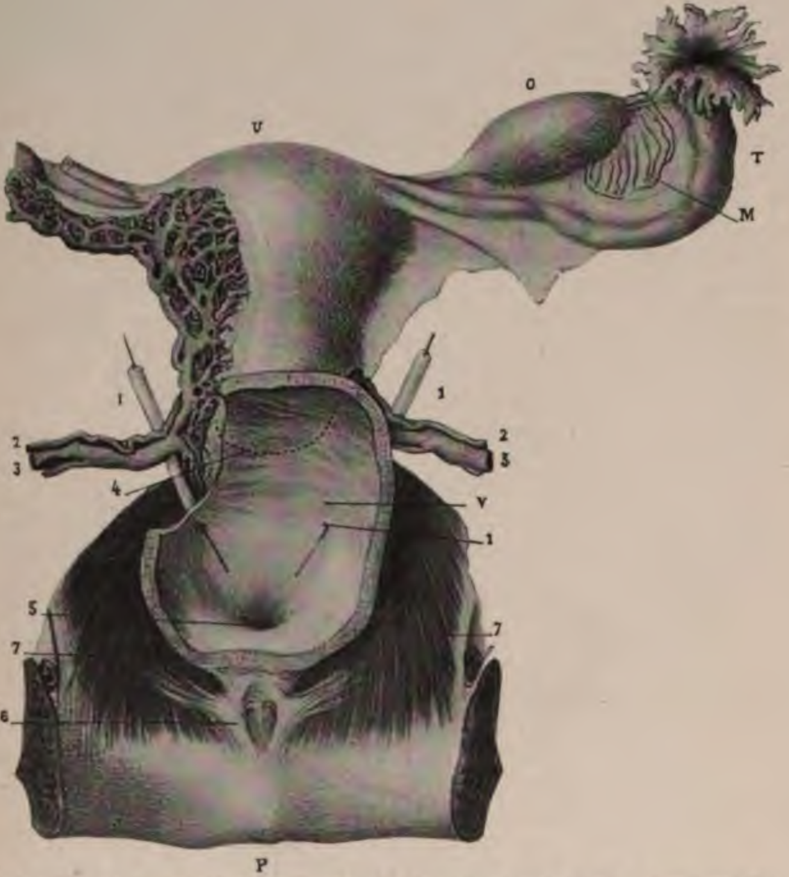


Fig. 120.—Vesicovaginal Septum and Base of Female Bladder. Anatomic Relations of Ureters at Their Entrance into the Bladder. Contents of Alar Ligament.—(*Savage.*)

1, 1. Ureters. 2. Uterine artery. 3. One of the uterine veins. 4. Dotted line indicating the vaginal end of the uterine cervix. 5. Internal meatus urethræ. 6. Ligamentous process of fascia of pubococcygeus muscle and vesicopubic muscles. 7. Pubococcygeus muscle. U. Uterine body. O. Ovary, utero-ovarian muscular ligament, and grooved Fallopio-ovarian fimbriæ. T. Fallopian tube and fimbriæ inverted. M. Parovarium.

The bladder-wall consists mainly of muscular structure. The wall, dependent upon the amount of distention, varies from 0.5 to 1 cm. The muscular structure consists of longitudinal and circular fibers, the former mostly confined to the anterior and posterior surfaces. They may be traced from the vesical neck and pubes in front, where they are called the musculi pubovesicales, to the summit, where some of the fibers accompany the urachus.

The circular fibers are more marked near the vesical orifice, where they form the sphincter vesicæ.

The muscular layer is partly covered externally by the peritoneum, which will be discussed later, and internally by the mucous membrane, with which it is loosely connected by a layer of fibrous and elastic tissue. Because of this loose connection, the mucous membrane is thrown into folds when the bladder is empty, except at the trigone, where it is more intimately connected with the submucous layer and is much thinner.

The mucous membrane in life presents a rosy pink appearance, and is continuous with that lining the urethra and ureters. Its epithelium consists of three or more layers of epithelium resting upon a basement membrane. The superficial cells are squamous, but are smaller than the vaginal. The inferior layer is composed of columnar epithelium with long processes, while the middle one is made up of pyriform cells. The membrane is supplied with a rich plexus of fine capillaries and nerve-fibers; the latter are not marked in the trigone.

The bladder is but poorly supplied with lymphatics, and they communicate with the glands near the internal iliac artery.

201. **The ureters** are the urinary ducts through which the urine is carried to the bladder. Their course, previous to crossing the iliac arteries, is nearly parallel. The left ureter lies behind the lower end of the ilium. In their subsequent course the ureters extend downward, backward, and outward, along the lateral walls of the pelvis. At the spine of the ischium they bend downward, forward, and inward to the bladder, about 1 to 1.5 cm. on each side of the cervix. The distance between the ureters where they enter the bladder is 5 cm. They pass obliquely through the vesical wall and enter the bladder 2 cm. below and external to the cervix, where their orifices are still 4 cm. apart, but united by a prolongation of the longitudinal fibers of the ureter, known as the interureteric ligament. This ligament forms a transverse ridge between the two orifices, and serves as the base of the vesical triangle.

202. **The Rectum.**—The rectum is the lower extremity of the large intestine, and begins with the termination of the sigmoid

flexure, at the left sacroiliac synchondrosis, to end with the anus. The rectum in its course makes three curves: first, downward, backward, and toward the median line, from its origin to a point opposite the third sacral vertebra; then downward and forward behind the cervix uteri and vagina, parallel with the latter, until it turns directly backward at the anus. The space formed by the deviation of the rectum from the line of the vagina is occupied by the perineal body. The portion of the rectum involved in this deviation, which is about 2.5 cm. long, is known as the anus.

The entire length of the female rectum is twenty centimeters, and the canal is less curved than in the male, while its caliber is greater. The longitudinal muscular bands so characteristic of the colon are absent.

The rectum, artificially distended, shows a very large sac, immediately above the anus, which decreases upward, so that the upper portion, with the exception of the anus, is the narrowest part. This very dilatable portion is called the ampulla.

The anal orifice is quite dilatable. The anus forms an aperture which closes with its lateral surfaces in contact. The orifice is further obstructed by longitudinal folds of the mucous membrane. These folds are called the "columns of Morgagni," and the depressions between them, the "sinuses of Morgagni." These corrugations are produced by the contraction of the sphincter, and disappear when the anus is distended. Above the anus are various circular and oblique folds. Of the latter, three are permanent, and include a portion of the muscular as well as of the mucous structure. They are over a centimeter in depth. One involves the anterior wall, about two centimeters from the anus; another is situated upon the right side, at the level of the sacral promontory; while the third is situated midway between the other two, but upon the left side.

The lowest of these folds, called "the valve of Houston," was regarded by Hyrtl as a third sphincter, but has been considered by Chadwick as a detrusor; it facilitates the evacuation of the rectum.

The rectal wall consists of three coats—the peritoneal, the muscular, and the mucous membrane.

The arrangement of the serous coat will be considered with the peritoneum, but it should be remembered that a portion only of the rectum is enveloped by peritoneum. The muscular layer consists of longitudinal and circular fibers, but the former are more generally distributed, and not collected into bands, as in the colon. The circular fibers are deeply situated, and are more marked just above the anus, where they form a distinct ring, nearly half an inch in width, which is recognized as the internal sphincter. The mucous membrane is continuous with that of the intestine, although much thicker and more movable than that of the colon, and its great vascularity causes it to have a bright pink, or even red, color.

The mucous membrane is lined with columnar epithelium, and contains a large number of Lieberkühn's follicles, but no villi. The mucous membrane at the anus abruptly changes from the columnar to the pavement epithelium of the skin, which forms the so-called white line.

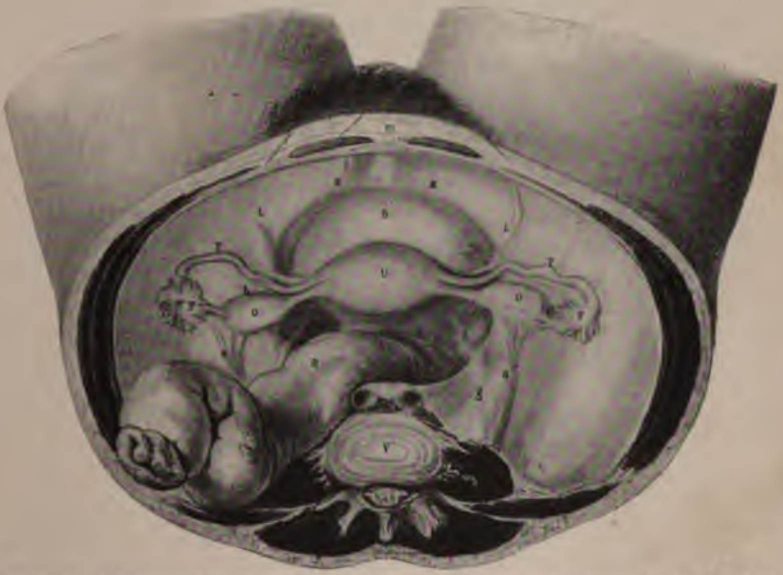


Fig. 121.—Horizontal Section of the Abdomen Immediately above the Crests of the Ilii: Behind, between the Last Lumbar Vertebræ and the Sacrum; in Front, about an Inch above the Pubis.—(*Savage.*)

B. Fundus of Bladder. U. Uterine body. O. Ovary and utero-ovarian fibromuscular ligament. L. Round fibromuscular ligament. T. Fallopian tube. F. Fimbriæ. V. Upper surface of the first bone of the sacrum. R. Rectum. a, a. Behind, spermatic vessels and nerves. b. Site of parovarium and bulb with the tubal mesentery. a, a. In front, obliterated remnants of hypogastric arteries. m. Urachus. g. Ureter.

203. Pelvic Peritoneum.—That portion of the serous lining of the abdominal cavity which is situated within the pelvis, and envelops the pelvic organs, is known as the pelvic peritoneum. Upon examination of a mesial section it will be seen to leave the anterior abdominal wall about three centimeters above the symphysis, and is reflected upon the fundus of the bladder. It covers the posterior surface of the bladder to the level of the internal os, and as much of the lateral surface as lies behind the obliterated hypogastric arteries. From the bladder it crosses over to the uterus, the anterior surface, fundus, and entire posterior surface of which it invests. Laterally from the anterior surface it extends outward upon a plane perpendicular to the pelvic brim, and is attached to the lateral wall of the cavity, thus forming the anterior fold of the broad ligament. The peritoneal investment posteriorly extends over the uterus and upon the upper part of the vagina, nearly three centimeters below the uterovaginal junction. The lateral prolonga-

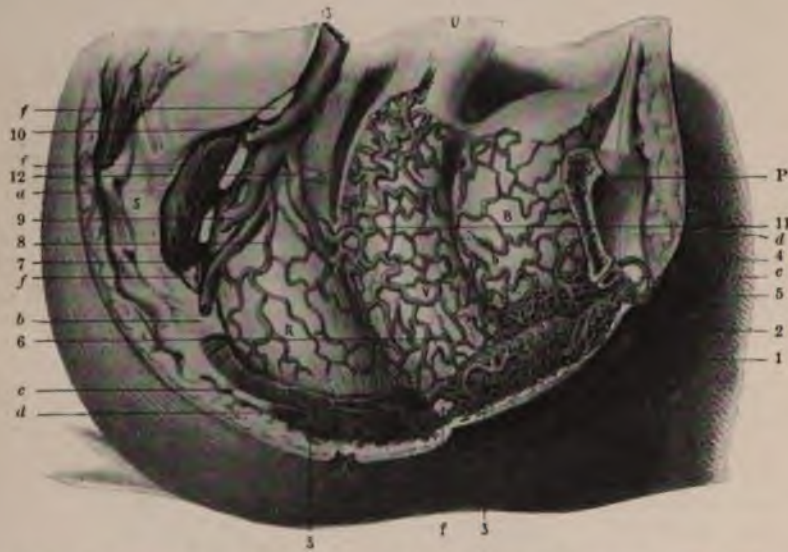


Fig. 122.—Relation of the Urethral and Vaginal Venous Plexuses with the Veins of the Clitoris and Bulb. The Right Side of the Pelvis Removed by a Section in Front, Through the Pubic Body, About an Inch from the Symphysis, and, Behind, through Sacro-iliac Joint.—(*Savage.*)

B. Bladder partially inflated, and b (*vis*), ureter cut just before it enters the bladder. V. Vagina distended. P. Section of pubis. R. Rectum. C. Clitoris. S. Sacrum. 1. Bulb. 2. Its urethral venous process. 3. Lower efferent veins. 4. Dorsal vein of the clitoris. 5. Urethral venous plexus. 6. Commencement of vaginal venous plexus. 7, 8, 9, 10. Sciatic and gluteal veins corresponding to arteries. 11. Uterine veins assisting to form the uterovaginal venous plexus. 12. Obturator vein. 13. Internal iliac vein. *a.* Pyriformis muscle. *b.* Larger sciatic ligament. *c.* Pubo-, obturato-, and ischio-coccygeal muscles. *e.* Suspensory ligament of the clitoris. e. Bulbovaginal gland. *f*, *f*, *f*. Roots of sacral plexus of nerves.

tion of this portion forms the posterior border of the broad ligament. The broad ligament contains the round ligament in its anterior fold; the Fallopian tube in its superior border, between the anterior and posterior folds; and its continuation after the termination of the tube is known as the infundibulopelvic ligament, the integrity of which is of importance in maintaining the ovary, and even the uterus, in position. Resting upon and projecting from the posterior fold, when the patient is erect, is the ovary, which is attached to the uterus by the ovarian ligament. The anterior and posterior leaflets of the broad ligament are separated, in addition to the structures named, by considerable loose, vascular, connective tissue, and afford entrance for the ovarian and uterine arteries and nerves, and egress for the veins and lymphatics, while its base is penetrated by the ureter upon its way to reach the bladder. From the vagina the peritoneum is reflected backward, to be attached to the anterior surface of the rectum and to the tissues in front of the sacrum. Above the promontory of the sacrum it is continuous with the posterior abdominal peritoneum.

The reflection of the peritoneum over the uterus and its extension in the broad ligaments upon each side divide the pelvis into two culdesacs—the anterior, or vesico-uterine, and the posterior, or uterorectal. The posterior culdesac is further divided by a prolongation of muscular structure from the sides of the uterus backward to the ileosacral synchondrosis, over which the peritoneum is reflected. This forms a deep, cup-shaped cavity directly behind the uterus, which is known as the pouch of Douglas. This pouch dips deeper on the left side, and sometimes extends to the upper border of the perineal body. When the bladder is empty and the nonpregnant uterus lies forward, the coils of small intestine usually occupy this pouch except at its very lowest point, and intra-abdominal pressure sometimes causes its dissection downward until a distinct hernia occurs behind the uterus. On either side, external to the uterosacral ligaments, is a fossa, which is known as the para-uterine pouch. This has been called by Polk the retro-ovarian shelf. On the side wall of the para-uterine pouch the ureter may be seen beneath the peritoneum. This space is occupied by the small intestine. During pregnancy the para-uterine pouch is lifted up to the pelvic brim, while Douglas' pouch remains unaffected. From before backward, we may find the following pouches or depressions: first, the pubovesical; second, the vesico-abdominal, which is seen only during distention of the bladder, and varies in depth according to the point at which the serous lining of the abdominal wall is reflected. The vesico-uterine pouch is bounded in front by the bladder; posteriorly, by the uterus. This pouch varies less than the others, on account of the firm attachment of the peritoneum to the anterior surface of the uterus. In the empty bladder the bottom of this pouch is about three centimeters distant from the anterior culdesac of the vagina, and the pouch rises somewhat as the bladder falls. The study of the female peritoneum renders it evident that it differs from that of the male in not being a closed sac, as it communicates with the uterine mucous membrane through the orifice of the Fallopian tubes, and is again perforated by the ovaries, which project through it. The close relation of the peritoneum to the pelvic viscera renders any change in this structure perilous to the normal situation and relation of these organs. Inflammatory changes result in thickening and cicatrization, which produce temporary, if not permanent, displacements. The fixation of the uterus, compression of the ovaries, and obstruction of the orifice of the Fallopian tube are necessary sequels of such alterations. The peritoneum, according to Luschka, serves as a sort of diaphragm, dividing the pelvic cavity into two portions; the one above may be called within the peritoneal space, and that

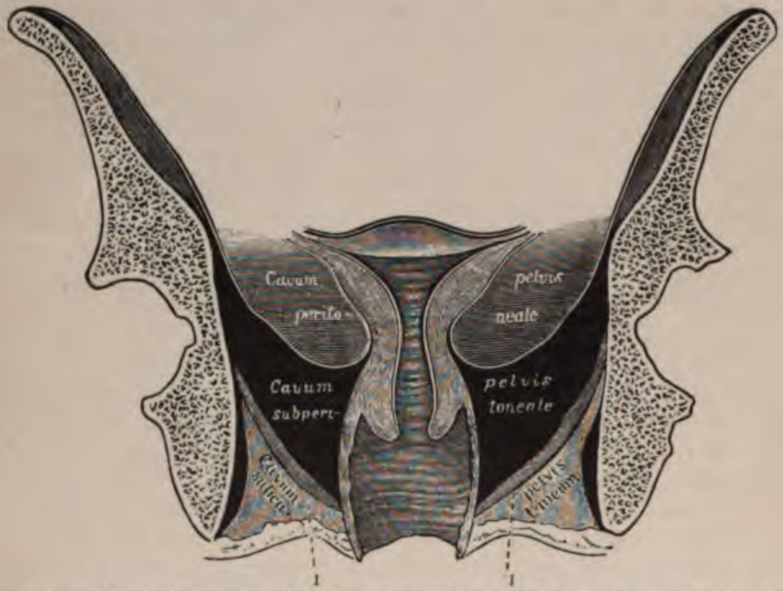


Fig. 123.—Vertical Transverse Section of the Pelvis, Showing Peritoneal Pouches. —(*Luschka.*)

1, 1. Levator ani muscle.

below, the subperitoneal. In the latter is situated the greater part of the pelvic connective tissue.

204. Pelvic Connective Tissue.—The pelvic connective tissue is a loose cellular tissue, which acts as padding for the support and safety of the pelvic organs. This structure is continuous with that which exists in other portions of the body. It appears in the pelvis in two varieties: first, as a loose tissue, distributed in an irregular manner around and between organs, and between the layers of the broad ligaments, where it acts as a support to the blood-vessels and folds of the peritoneum; second, as firm, well-defined lamina or planes entering into the formation of the pelvic floor. These have already been described under the name of pelvic fascia. The connective tissue is continued behind the symphysis as the retropubic fat, and there lies in front of the bladder. Between the base of the bladder and the vagina it is rather firmly connected. On the posterior surface of the vagina there is a very loose layer connecting it with the rectum. A large mass is found on each side of the cervix uteri, forming under the broad ligaments what is known as the parametrium, which is united in front and behind by a much thinner layer. Over the body of the uterus connective tissue is very slight and does not contain fat. The rectum and vagina are embedded in considerable masses of this tissue. From the uterus and the parametrium a thin layer extends between the leaflets of the broad ligament, and serves as a support for the vessels. The chief mass of this tissue is situated around the cervix, and extends downward around the vagina to the insertion of the levator ani muscle. The distribution and relation of the pelvic connective tissue have been studied in different ways. The most valuable method is by the examination of frozen or spirit-hardened pelves, by which the position of the tissue, its amount, and its distribution are recognized. Injections of air, water, and plaster-of-Paris have been made beneath the pelvic peritoneum in order to determine the lines of cleavage in the pelvic connective tissue and the directions in which pus would be likely to burrow. König made investigations upon the bodies of women who had died shortly after labor from nonpuerperal disease. When an injection is made between the layers of the broad ligament, high up in front of the ovary, it first passes into the tissue at the highest part of the side wall of the true pelvis; then into the iliac fossa, lifting up the peritoneum; follows the course of the psoas, and passes but slightly into the hollow of the iliac bone; finally, it separates the peritoneum from the anterior abdominal wall some little distance above Poupart's ligament, and from the true pelvis below it. Second, when the injection is made beneath the base of the broad ligament and in front of the isthmus, the deep lateral tissue becomes filled first; then the peritoneum is lifted from the anterior part of the cervix uteri. Separation extends to the tissue in the bladder, and ultimately along the round ligament and the inguinal ring, where it separates the peritoneum along the line of Poupart's ligament and enters the iliac fossa. Third, an injection at the posterior part of the base of the broad ligament fills the tissues around Douglas' pouch, and then follows the course as first described.

205. The Vascular Supply.—The pelvic organs and peritoneum are supplied through the ovarian, uterine, vaginal, and internal pudic arteries. The ovarian arteries, analogs of the spermatic in the male, arise from the abdominal aorta just below the renal branches and pass downward over the psoas muscles, beneath the ureters, enter the broad ligaments, and pass to the side of the uterus, near which each divides into two branches. The upper supplies the fundus uteri, and the lower anastomoses at the side of the uterus with the anastomotic branch of the uterine artery. In its course the ovarian artery gives off branches to the ampulla of the Fallopian tube and to the isthmus, and numerous branches to the ovary. A small branch is given off to the round ligament. The uterine artery springs from the anterior division of the internal iliac, passes downward and in-

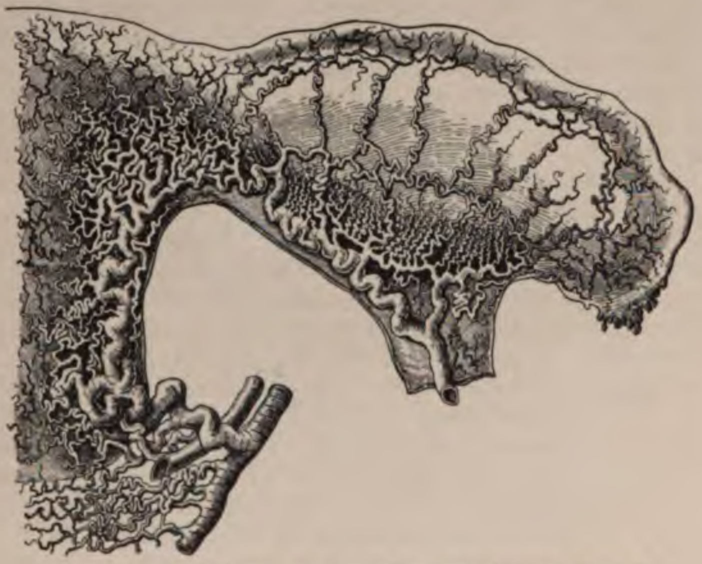


Fig. 124.—Distribution of the Uterine and Ovarian Vessels.

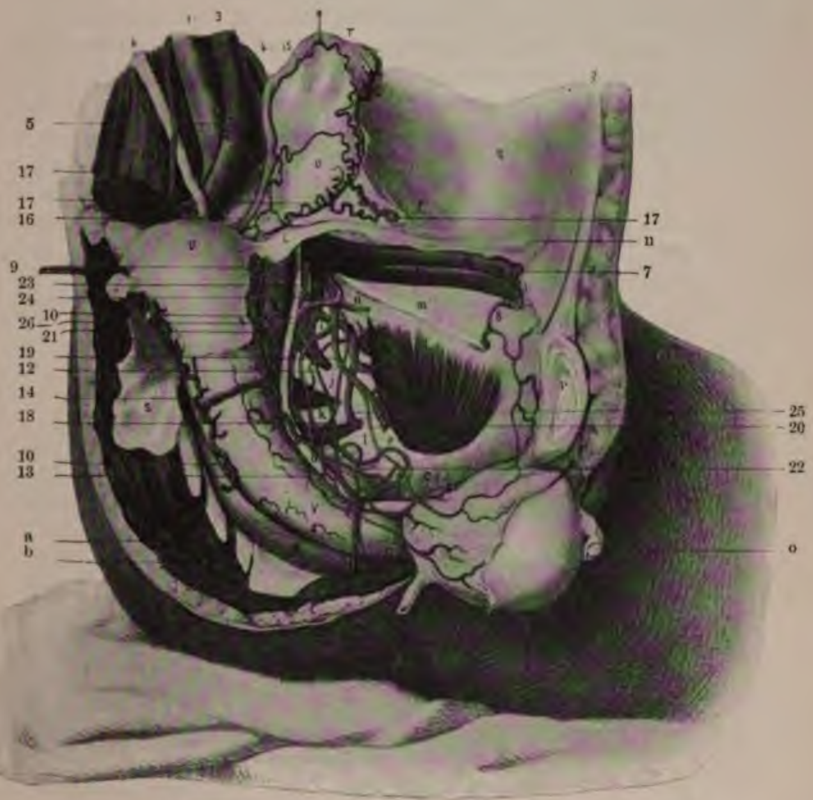


Fig. 125.—Arteries of the Female Pelvic Organs.—(*Savage.*)

1. Vena cava inferior, receives right and left common iliac veins. 2. External iliac vein. 3. Abdominal aorta. 4. Inferior mesenteric artery. 5. Right common iliac artery. 6. External iliac artery. 7. Epigastric artery. 8. Obturator branch of epigastric artery. 9. Internal iliac artery, crossed in front by h, the ureter. 10. Uterine artery. 11. Obturator artery; its course is along with and below m, the obturator nerve. L. Round ligament. 12. Inferior vesical artery. 13. Vaginal branch from it. 14. Uterocervical artery. 15. Artery of the Fallopian tube. 18. Vaginal artery. 17, 17, 17. Spermatic arteries. 19. Pudic artery. 20. Superior vesical artery. 21. Inferior hemorrhoidal artery, joined at 22, another inferior vesical branch. 23. Posterior division of internal iliac artery, terminates in (24) iliolumbar lateral sacral, and (25) gluteal. 26. Sciatic arteries. B. Bladder. O. Urachus. V. Vagina undistended, resting on (R) the rectum. O. Ovary. T. Fallopian tube. 15. Fallopian branch. U. Uterus. L. Round ligament. S. Sacral articular surface of sacro-iliac symphysis. P. Pubic symphysis, articular surface. a. Pyriformis muscle. b. Gluteus maximus muscle. c. Obturatococcygeus muscle. p. Spine of the ischium. f, f. Psoas muscles. g. Linea alba. h, h. Ureters. i, j, k, l. Trunks of sacral nerves resting on the pyriformis muscle. m. Obturator nerve. q. Peritoneum covering the transversalis fascia.

ward toward the cervix uteri, then upward between the layers of the broad ligament in a very tortuous course, and anastomoses with the lower branch of the ovarian. This portion is sometimes called the anastomotic branch, or the puerperal branch, as by its tortuous course it permits the vessel to be straightened out during the enlargement of the uterus in pregnancy. The primary branches given off by the uterine artery are separated from the peritoneum only by a thin layer of muscle-fibers. These give off secondary branches, which penetrate the muscular wall in a direction at right angles to its mucous layer. They anastomose freely and end in capillary loops in the mucous membrane. The vaginal branches spring direct from the anterior trunk of the internal iliac, but sometimes are given off from the uterine or the

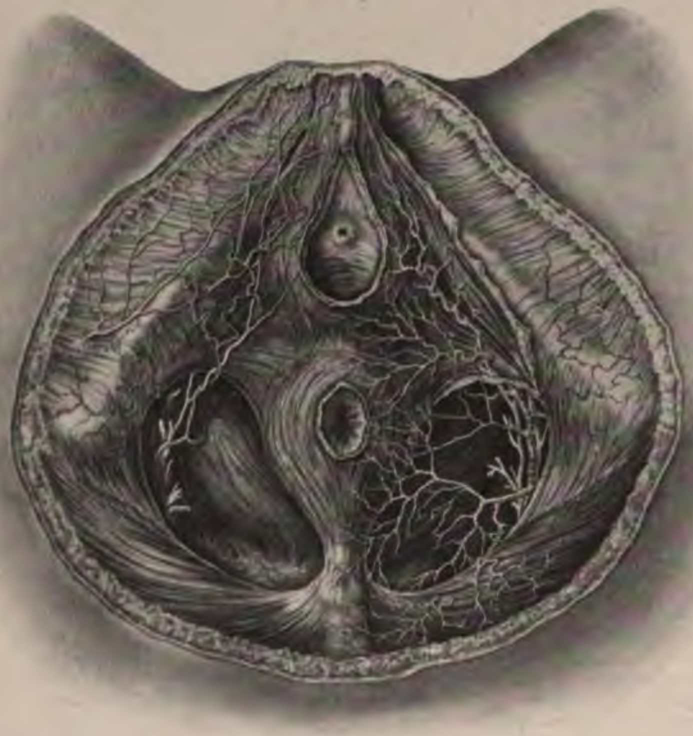


Fig. 126.—Distribution of the Pudic Artery to the Structures of the Perineum.— (*Deaver.*)

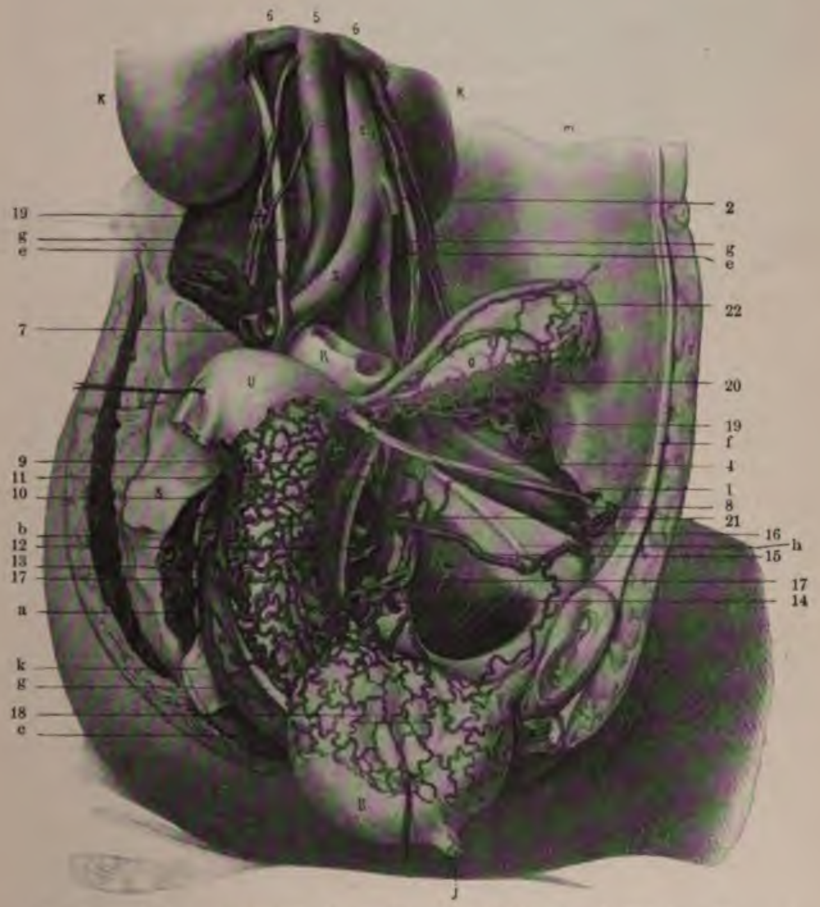


Fig. 127.—Veins and Erectile Venus Plexuses of the Female Pelvis.—(*Savage.*)

B. Bladder. R. Rectum. L. Round ligament. U. Uterus. O. Ovary. V. Vagina. S. Sacro-iliac articulation. K. Kidney. T. Fallopian tube. P. Pubic symphysis. a. Pyriformis muscle. b. Gluteal muscles. c. Ischiococcygeus muscle. d. Internal obturator muscle. e, e. Psoas muscles. f. Linea alba. g, g. Ureters. h. Obturator nerve. i. Internal inguinal ring, site of canal of Nuck. 1. Abdominal aorta. 2. Inferior mesenteric artery. 3, 3. Common iliac arteries. 4. External iliac artery. 5. Vena cava. 6. Renal veins. 7, 7. Common iliac veins. 8. External iliac vein. 9. Internal iliac artery. 10. Gluteal. 11. Ileolumbar. 12. Sciatic. 13. Pudic. 14. Obturator. 15, 16. Epigastric veins. 17. Uterine vein. 16. Vaginovesical venous rete. 19. Spermatic veins. 20. Bulb of the ovary. 21. Vein to round ligament. 22. Fallopian veins.

middle hemorrhoidal. A special branch of the uterine artery to the cervix joins with its fellow of the opposite side to form the circular artery of the cervix, and with the vaginal branches forms the azygos artery of the vagina. Extensive anastomosis takes place between the vessels of the opposite sides. The entrance of the vessels by the broad ligament enables us in extirpation of the uterus to control hemorrhage by ligation of the latter. The anterior division of the internal iliac also affords the blood supply to the bladder and rectum. The per-

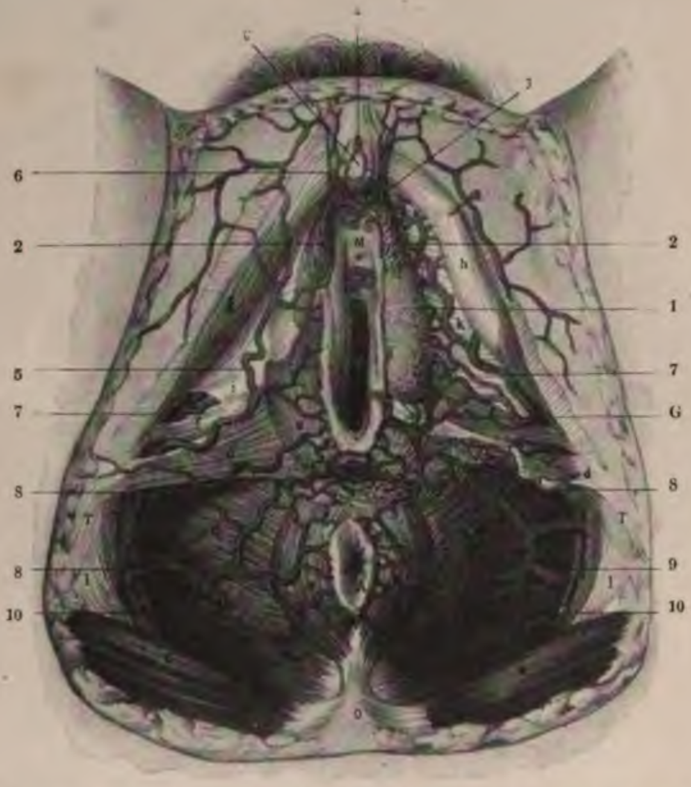


Fig. 128.—Erectile Organs and Veins of the Female Perineum.—(*Savage.*)
h, g. Crura clitoridis. 1, 2. Bulb of the vagina. 3. Vestibular intercommunicating branches. 5. Superficial perineal and obturator veins. 6. Veins of communication with superficial epigastric veins. 8, 9, 10. Pudic vein and primary branches. M. Urethral orifice or meatus. V. Vaginal aperture. A. Anus. T. Tuberosity of ischium. O. Coccyx. G. Vulvovaginal gland.

ineal region is supplied through the internal pudic artery—a branch of the anterior trunk of the internal iliac. It passes out through the greater sciatic notch and enters through the lesser, passing around the spine of the ischium. In its course it lies upon the internal obturator muscle, and is inclosed with the pudic nerve in a canal formed for it by the obturator fascia. It gives off the following branches: The inferior hemorrhoidal; the transverse perineal; the superficial perineal or vulvar artery, which is much larger than the corresponding branch in the male—the artery of the bulb; the profundi branch to the crus clitoridis; and the dorsal artery of the clitoris. The round ligament receives a small branch from the epigastric artery, which anastomoses with the branch from the ovarian. The *venous distribution* of the pelvis is very abundant, and occurs in the form of numerous plexuses, which freely communicate with one another. These veins are unprovided with valves. As a consequence, hemorrhage from the injured part, especially during pregnancy, when the whole pelvic vascular system is engorged, will be exceedingly profuse. Dissection discloses a vesical plexus, which lies external to the muscular coat of the bladder. The hemorrhoidal plexus is below the mucous membrane of the lower part of the rectum. The veins of the labia correspond in their distribution to the arteries; thus, from the outermost parts they drain into the pudic, which opens into the common iliac vein. The large veins from the labia minora open into the pars intermedia above. The blood returns from the glans and corpus clitoridis through the dorsal vein of the clitoris, which communicates with the vesical plexus. The vaginal plexuses are situated, one in the submucous tissue, the other in the outside of the muscular coat. These communicate with the hemorrhoidal and vesical plexuses, receive the blood from the veins of the bulb, and empty into the internal iliac vein. The uterine plexus is very complex, and empties into the ovarian veins. The one on the right passes the inferior vena cava; and the one on the left, the left renal vein. The right ovarian vein is provided with a valve, where it pierces the coat of the inferior vena cava, while the left is without one. To this arrangement is attributed the greater frequency of pain and disease in the left ovary. The ovarian or pampiniform plexus lies between the folds of the broad ligament and communicates with the uterine plexus. The ovarian plexus opens into the inferior vena cava. At the hilum of the ovary is situated the collection of veins known as the bulb of the ovary. The vesical, hemorrhoidal, and vaginal plexuses, with the pudic veins, empty into the internal iliac vein, which joins the inferior vena cava. From the hemorrhoidal plexus there is a communication with the portal system through the superior hemorrhoidal vein.

206. The Lymphatic System.—This comprises: first, the lymphatic glands; second, the lymphatic vessels. The lymphatic glands are: (*A*) the inguinal glands, which lie parallel to and just below Poupart's ligament; (*B*) the pelvic glands. These

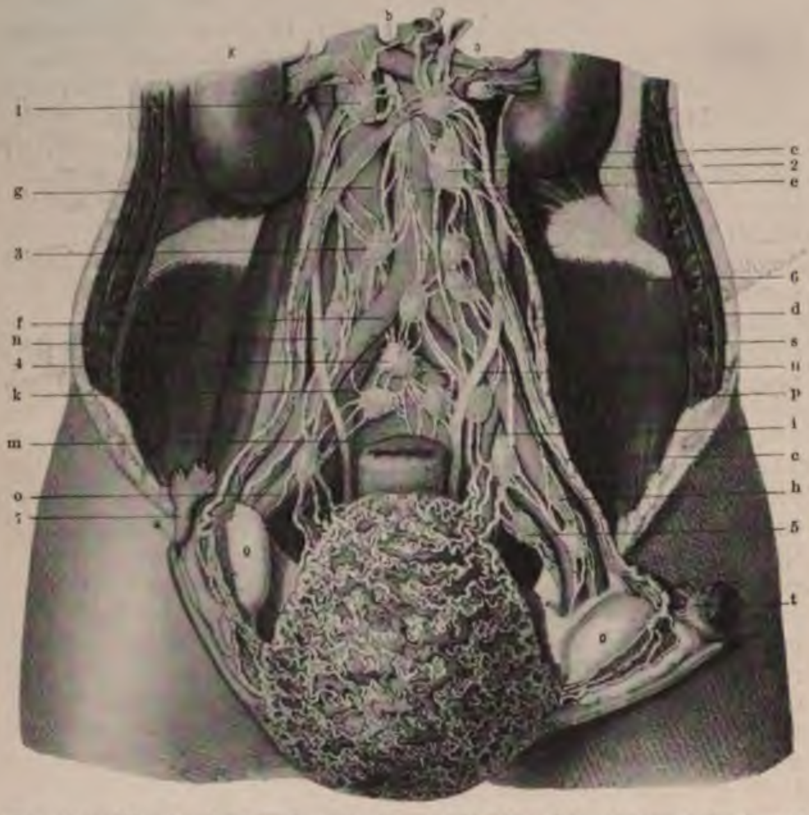


Fig 129.—The Lumbo-iliac Lymphatics and Glands. Lymphatics of the Gravid Uterus and Appendages.—(*Savage.*)

1, 2. Superior lumbar glands. 3. Inferior lumbar glands. 4. Sacral lymphatic glands. 5. External and internal lymphatic glands. 6. Common iliac glands. 5, 7. Spermatic lymphatic plexus. a. Left renal vessels. b. Left renal vein. c. Left spermatic vein. d. Left spermatic vessels, covered by their lymphatic plexus. e. Aorta. f. Common iliac trunks. g. Ascending cava. h. External artery and vein. m, n. Ureters. o. Right common iliac vein. p. Iliacus muscle. s. Psoas muscle. O. Ovary reversed, showing lymphatics between it and its bulb.

comprise: (*a*) a gland situated at the isthmus uteri (*b*); the hypogastric or iliac glands, which lie beneath the peritoneum, in the space between the internal and external iliac vessels; (*c*) the sacral glands, situated on the lateral aspect of the anterior surface of the sacrum and the mesorectum; (*d*) a gland or small collection of glands at the obturator foramen, known as the obturator gland of Guerin. All these glands discharge into the lumbar glands, which lie in front of the lumbar vertebræ, and finally into the thoracic duct. The lymphatics of the external genitals form an extensive network on the internal aspect of the labia majora, over the labia minora, around the vaginal and urethral orifices, the vestibule, and the clitoris, and all discharge into the inguinal glands. As a consequence, syphilis or cancer involving the vulva or lower fourth of the vagina causes involvement of these glands. In the upper three-fourths of the vagina and cervix uteri the lymphatics open into the hypogastric glands. This is true not only of the lymphatics of the upper three-fourths of the vagina and cervix, but also of the lymphatics of the bladder. The lymphatics of the uterus pass through the broad ligaments with those of the ovary and tube, and enter the lumbar glands. Some of the uterine lymphatics pass along the round ligament to the glands of the groin. Leopold, in investigating the lymphatics in the unimpregnated uterus, regards the mucous membrane of the organ as a lymphatic surface consisting of lymph-sinuses covered with endothelium. The lymph passes from these spaces into the vessels of the muscular coat, and flows into the larger vessels which enter the broad ligaments. The distribution of these vessels and their extensive character account for the rapidity with which septic matter is absorbed from the uterine cavity and explain the various routes by which bacteria can pass through lymphatic canals or penetrate the blood-vessels.

The lymphatics of the rectum lie in the mucous and muscular layers and open into the glands of the mesorectum or into the sacral glands.

Nerves.—The nerves distributed to the pelvic organs are derived from the spinal and sympathetic. The branches from the spinal nerve consist of the inferior hemorrhoidal branch of the pudic from the fourth and fifth sacral, and of the coccygeal nerves. These nerves supply the levator ani, sphincter, and coccygeus muscles; the muscles of the perineum and clitoris are supplied from the branches of the internal pudic, which nerve terminates in the nervous plexus of the glans clitoris. The hypogastric plexus, derived from the sympathetic, lies between the common iliac arteries, and distributes branches, which are rein-

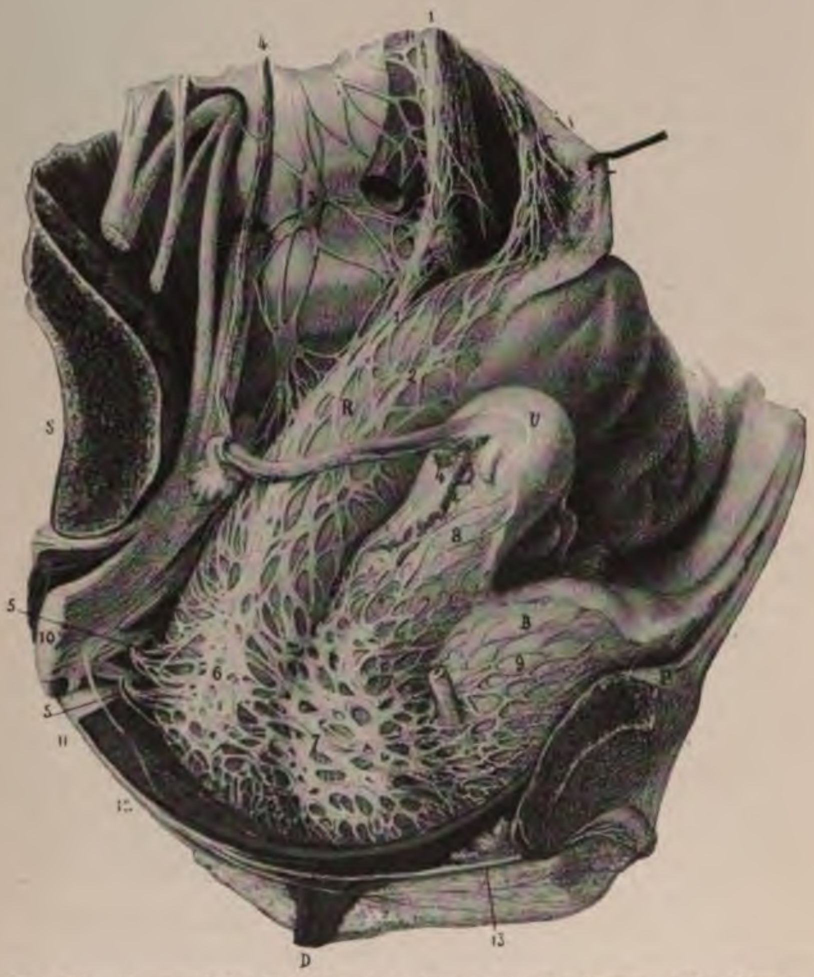


Fig. 130.—Nerves of the Unimpregnated Uterus with the Nerves of the Clitoris. —(*Savage.*)

1. Hypogastric plexus. 2. Rectal branch of inferior mesenteric plexus. 3. A lumbar ganglion of the sympathetic. 4. Spermatic plexus, supplies Fallopian tube, ovary, and part of the uterus. 5. Branches from third and fourth sacral, aiding to form 6, 7, right inferior hypogastric plexus. 8. Uterine filaments. 9. Vesical plexus and branch. 10. Trunk of great sacrosciatic nerve. 11. Muscular branch of the fourth sacral nerve. 12. Trunk of pudic nerve. 13. Continuation of 12 into dorsal nerve of the clitoris. R. Rectum. U. Uterus. B. Bladder. D. Transversus perinei muscle cut across. S. Section of ilium. P. Section of symphysis.

forced by others from the lumbar and sacral ganglia and sacral nerves, to form the inferior hypogastric plexuses, one of which is situated on each side of the vagina. These plexuses distribute filaments to the vagina, uterus, Fallopian tube, and ovary. The pelvic, splanchnic, and hypogastric nerves are motor and sensory to the bladder; the pudic is motor to the sphincter; and all the muscles of the vagina and clitoris are sensory to the skin of the perineum, and especially so to the mucous membrane of the glans clitoris. The terminal filaments in the uterus are found in the nuclei of the unstriped muscle. Those of the mucous membrane are said to end in the ganglia. End-bulbs have been found in the clitoris and vagina. In the ovary the nerves pass to the Graafian follicle and to the walls of the membrana granulosa.

207. **Consideration of the Pelvic Organs and Structure Studied as a Whole.**—In the upright position the plane of the brim of the pelvis is at an angle of 60 degrees to the horizon. The fundus of the uterus lies just below this plane, with its axis at right angles to it, and consequently at right angles to the vagina, which is parallel to the brim of the pelvis. In the upright position the internal abdominal pressure is directed against the symphysis and the posterior surface of the fundus of the uterus when in its normal situation.

The uterus, as we have seen, is freely movable—swung in its position in the pelvis by the ligaments. The broad ligaments maintain it in the center of the pelvis, and by their position and relation serve to assist in maintaining it in an anteflexed position. The round ligaments are an additional stay, and when of normal resiliency, draw the fundus forward. The other ligaments are the uterovesical and the uterosacral. The former are the reflection of the peritoneum from the bladder to the uterus; the latter, while consisting of folds of peritoneum, also contains muscle-fibers, from the superior muscular layer of the uterus. The action of the latter filaments is to hold back the cervix, while the intra-abdominal pressure will maintain the fundus forward. Deviations from the normal inclination of the pelvis, from the normal resiliency and tone of the ligaments, from the proper relations and support of the vagina, increase in the weight of the uterus, and increased intra-abdominal pressure are all factors in the production of uterine displacement, and especially that form characterized by descent. The plane of the outlet of the pelvis when the patient is erect forms an acute angle in front with the horizon. The urethra, the vagina, and the rectum, in the upper part of its course, are parallel to the plane of the brim of the pelvis. The lower portion of the rectum turns acutely backward and forms an axis at right angles to that of the vagina. This portion, the anus, looks backward and downward; consequently, the introduction of the finger or of the nozle of a syringe must be directed forward and upward, or directly toward the vagina, and after passing into the anus, is carried upward and backward. On median vertical section the vagina will be seen to be a mere slit, slightly S-shaped, the lower part of which presents the convex surface of its posterior wall anteriorly. The pelvic floor is consequently divided into two segments, the anterior and upper of which rests upon the more fixed posterior segment. The rectum at the anus is found to form an anteroposterior slit.

Intra-abdominal force first causes pressure of the anterior segment upon the posterior, and then a sliding backward of that portion of the inferior segment in front of the anterior wall of the rectum.

PHYSIOLOGY.

208. Functions.—The important functions of the genital organs are the processes associated with reproduction. These comprise the alterations in the organs by which menstruation is established, repeated monthly, and finally discontinued; the relation of the sexes in copulation; the fecundation of the ovum, its subsequent nutrition, and the procedure by which the matured product attains a separate existence.

1. The transition from child to woman, indicated by the appearance of menstruation, is denominated *puberty*.

2. The completion of development, which fits the individual for the processes of maternity, is called *nubility*.

3. The deposit of the vitalizing principle of the male within the body of the female occurs through the act of *copulation*, and its union with the ovum is known as *fecundation*.

4. The nutrition of this vitalized structure and its subsequent course of development are recognized as *gestation*.

5. The processes by which the matured product is afforded a separate existence is known as *parturition*.

The first three of these divisions and their variations from the normal comprise the field of gynecology.

209. Puberty.—The completion of the developmental process that results in the establishment of menstruation and ovulation, has been called *puberty*. It marks the transition from the child to the woman, and occurs between the thirteenth and fifteenth years. The age of the individual differs under varying circumstances. Puberty occurs earlier in the natives of hot climates than in those of the north, and earlier in the Latin races than in the Anglo-Saxon. City girls mature at an earlier age than those raised in the country, and those raised in affluence sooner than the poor. The occurrence of the function of menstruation prior to the age of thirteen is *precocious puberty*. Such instances are not infrequent. Isolated cases occur in which it appears at a very early age. Rein reports the case of a girl of six years whose pubes were covered with hair and who menstruated regularly for a year. The "New York Medical Record," 16, XI, 1895, presents a report of a girl who gave birth to a child when ten years of age.

Retarded or *delayed puberty* is caused by chlorosis, plethora, or some congenital condition of the genital tract. Numerous cases are recorded where women have given birth to children without the establishment of menstruation; in other words, ovulation occurs without the usual manifestation.

The advent of puberty is manifested by other characteristics than menstruation. The figure becomes more rounded, from an increase of adipose tissue. The breasts enlarge and frequently become painful. Hair grows upon the mons veneris and labia majora. Under this process occurs increased blood formation, the development of glandular structure, particularly in the uterus and the mammary gland, and, especially, marked changes in the nervous system. "There is," Christopher Martin says, "a remarkable transformation in the psychic, emotional, and mental life of the girl. The current of her thoughts is mysteriously changed. Hopes and yearnings unknown before thrill and agitate her, and life acquires a new and deeper meaning. These profound and subtle changes are not so difficult to understand if we accept the view that puberty means the sudden bursting into activity in the midst of the nervous system of a hitherto dormant center."

The glandular development of the mammæ may be so rapid and at times so irregular as to simulate a tumor. The period of life should prevent error.

210. Nubility.—The advent of puberty indicates that the functions are established that will permit procreation, but the structures are not sufficiently developed to render the individual suited for favorable reproduction. Experience has demonstrated that the mortality is much greater among those who come to the completion of gestation prior to the age of twenty. Women coming to early maternity mature early, reach the menopause at an early age, and are prematurely aged.

211. Menstruation and Ovulation.—Menstruation—also called the menses, the monthlies, the courses, the turns, the sickness, and the periods—has been defined by Sutton as "the periodic discharge of blood from the uterus, accompanied by the shedding of the epithelium of the body and fundus, as well as of that lining the utricular glands near their orifices."

Ovulation is the discharge of an ovum from a matured Graafian follicle. These two processes are considered here in co-relation, though we have no positive proof that they are co-dependent. We have positive determination that they are occasionally independent of each other. The not infrequent occurrence of pregnancy prior to the advent of puberty and subsequent to the climacteric is an indication that ovulation can occur without menstruation. Cases are recorded where a woman has had a number of children without menstruation ever having occurred.

Menstruation, in the majority of women, occurs every twenty-eight days, and the flow lasts from two to eight days. The intervals may vary from twenty-one days to five or six weeks. It does not always occur at an absolutely definite date in the same individual.

The quantity of blood lost is difficult to determine. The average amount is estimated at from three to five ounces. It has been mentioned that the flow varies in duration from two to eight days. A flow shorter than two or longer than eight days in duration indicates an abnormal condition. Absent or greatly decreased flow is known as amenorrhea. The prolonged or excessive flow is called menorrhagia. When the function is associated with severe pain, it is pronounced dysmenorrhea. The menstrual discharge is not pure blood, but consists of blood-corpuscles mixed with mucus and desquamated uterine epithelium. In ordinary conditions it is a bright fluid, but when the flow is excessive or rapid, it comes away in large and dark clots.

The duration of menstrual life is nearly thirty-five years, and, like its advent, the period of final cessation may be advanced or retarded by various causes.

Menstruation occurs only in women and in some monkeys; it is apparently limited to those animals that maintain the erect position.

The flow is generally preceded by some premonitory symptoms—a sense of weight, pressure, or uneasiness in the pelvis and back, and extending down the limbs. Mental and nervous irritability are frequently marked. Special nervous characteristics are exaggerated during, and especially immediately preceding, the flow. The mental equilibrium is frequently disturbed, and women exhibit delusions during menstruation who are perfectly rational during the intervals. Epilepsy, migraine, and other nervous manifestations are prone to occur or to be exaggerated during or near the period.

In the menstrual process the uterus and pelvic viscera become engorged with blood; the uterus is enlarged, turgid, and sensitive; the capillaries rupture, some upon the surface and others within the mucous membrane. The uterine epithelium becomes desquamated; during the process of engorgement the glands have become filled with epithelium, which is discharged from the external portion of the gland. Many of the cells are liquefied, increasing the quantity of mucus. With the establishment of the flow the engorgement is relieved and the general disturbance subsides. After the termination of the period the mucous surfaces are gradually regenerated from the epithelial tissue remaining in the glands, until at its culmination the process is again renewed. According to Napier, this desquamation and regeneration of the structures from the utricular glands, and the accumulation of glandular products in the uterine glands and the ovaries, stands in a causative relation to menstruation.

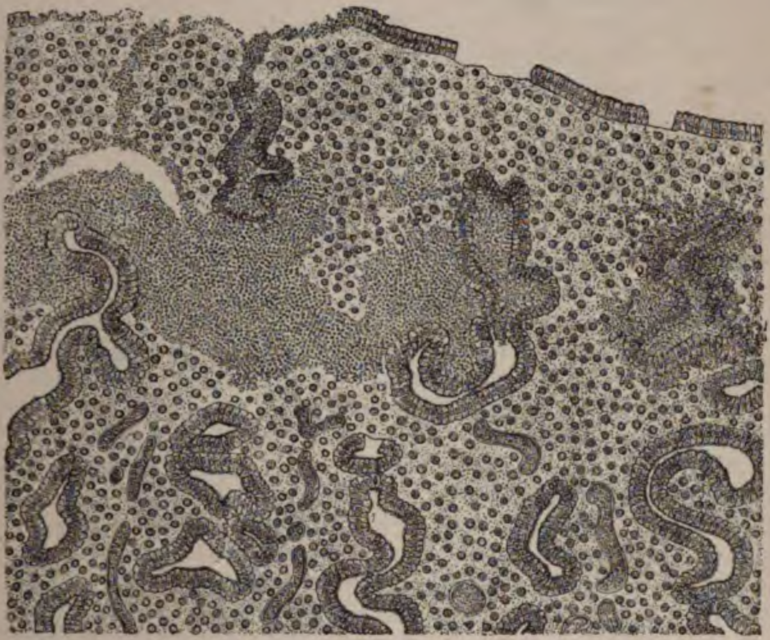


Fig. 131.—Changes of Uterine Mucous Membrane During Menstruation.—(*Wyder.*)

It is only when the ovaries and utricular glands attain a development that renders their secretion capable of exerting a dominating influence upon the general economy that puberty occurs, and the process continues until these structures begin to atrophy and cease to exert their governing course. Napier denies the probability of the period being induced by ovulation, and cites the occurrence of the latter without menstruation, and the continuation of menstruation after the removal of both ovaries, as presumptive evidence. Many other theories are advanced for the periodic occurrence of menstruation. Johnstone believes in a special menstrual nerve plexus, situated near the cornua of the uterus; but this structure has not been recognized by any other observer.

My observation leads me to doubt that menstruation occurs after the complete removal of ovarian stroma. An occasional discharge of blood does not constitute menstruation. The presence of the ligature upon the nerves of the ligament will cause a bloody flow a few days subsequent to removal of both ovaries, though the operation had been preceded a few days by the regular menstrual discharge. Doubtless a continued irritation may be a cause for other discharges. The removal of the appendages by the use of the Staffordshire knot or the single transfixion of the pedicle and its ligation in two portions is prone to leave a portion of the ovarian stroma upon the stump, and menstruation will recur until the retained stroma is exhausted.

The alteration of the uterine mucosa which occurs during menstruation prepares it for the reception and nutrition of the fecundated ovum. The fact that gestation occurs without an intervening period is no contravention of this supposition, but only a demonstration that the preparation can occasionally occur without the shedding of blood.

The nerve influence leading to the increase of the liquor folliculi, the liquefaction of the cells of the membrana granulosa, promotes the multiplication of cells in the mucosa, which is followed by menstruation. The coexistence of these processes is seen in the formation of a corpus luteum synchronous with menstruation. The course of menstruation is averted by pregnancy. Menstruation continues during pregnancy only with the rarest exceptions, and the functional activity of the ovaries is suspended during lactation. Neither ovulation nor menstruation generally occurs during lactation. Many women prolong the period of lactation with the purpose of rendering themselves less susceptible to fruitful coition.

212. **Menopause.**—The conclusion of the menstrual activity is recognized as a critical period in a woman's existence. It is variously denominated the menopause, climacteric, and change

of life. The menstrual life of the woman lasts, upon an average, nearly thirty-five years, so that the period should occur between the forty-seventh and the fiftieth year. Its occurrence may be accelerated or retarded by various causes.

Premature menopause occurs prior to the age of thirty-two, and may be induced by shock, severe illness, prolonged anxiety, overstudy, mental affections, disease of the ovaries,—such as destruction of the ovarian stroma by double ovarian tumors,—sepsis, chronic disease of the appendages, and some forms of metritis.

Early menopause occurs between the ages of thirty-two and forty-two. It occurs early in the virgin, and earlier in blonds than in brunets. Fat women reach the menopause early. A rapid increase in adipose is associated with some cases of premature menopause. Occasionally the menopause occurs at an early age without an assignable cause.

Retarded or Delayed Menopause.—The occurrence of the menopause is distinctly affected by heredity.

It may be delayed by child-bearing, by the presence of uterine growths, and by the presence of malignant degeneration. Robertson reports the case of a woman who ceased for twelve months to menstruate at fifty, when the flow returned, and continued until her death at seventy. Saxonia speaks of a nun who had a return of her menstruation at the age of one hundred, and it continued regularly until she died three years later.

The term menopause is employed to designate the period of the change. The average duration of the menopause is about two and one-half years. A few fortunate persons continue to menstruate regularly until a certain period, when the flow ceases, never again to recur. Others continue irregular for six months, when it ceases. Generally, a patient will notice that the periods are getting more scant, until finally she misses a period or two; then menstruation recurs for a while, to again subside, thus continuing irregularly over one or two years. The irregularity may be prolonged over four or five years. While, as a rule, the intervals are longer, the periods may occur more frequently, with intervals of but twenty-one, or even fourteen, days.

The flow may be increased, and occasionally hemorrhages occur without any assignable cause.

Excessive or prolonged bleeding should always be a cause of anxiety, and should lead to careful examination for its cause. The cause should not be assigned to change of life until careful investigation has eliminated every other source. The occurrence of menstruation is attended with the elimination of certain materials from the blood.

Chemic changes in the blood and tissues are constant, and the elimination of the albuminoids during menstruation is demonstrated by a more marked alteration of the blood following menstruation than the mere loss of blood would produce.

When menstruation is arrested by anemia or pregnancy, we see in the skin marked pigment deposits of materials that would be eliminated by menstruation.

When the menopause occurs suddenly, such retained products produce an intoxication, resulting in various nervous perversions. It is a very usual occurrence to witness various vasomotor disturbances, such as sudden sensations of heat; flushings; waves of blood rolling up to the face, with a sensation of giddiness, suffocation, or oppression; cold, clammy perspiration; shooting neuralgic pain; headaches; fullness of the vessels of the head and neck; palpitations; gastric irritation; diarrhea; irritability of temper; vasomotor disturbances; melancholia; and disturbed mental balance.

In sudden production of the climacteric after radical operations the vasomotor disturbances are sometimes so distressing as to render the condition for which the operation was performed preferable.

Treatment.—The more distressing vasomotor disturbances can be ameliorated by the employment of tonics, good food, and rest; the administration of the bromids and of nerve sedatives; the administration of large doses of asafetida; the regulation of the bowels; and the promotion of digestion.

Picrotoxin in $\frac{1}{80}$-grain doses three times daily seems to exert a specific influence in some cases.

213. **Copulation** is that act of union of individuals of the two sexes by which the vitalizing principle of the male is deposited in the genital organs of the female. The sexual desire in the woman is much less marked than in the man. Frequently she has no sexual sensation, and the act is even repugnant, but she yields to the man's embrace from her wish to gratify his desire. Such a woman, mated to a man of impetuous inclination, often becomes a sexual slave. The clitoris and the tissues about the vestibule are erectile, and take part in the orgasm, during which secretion is ejected from the vulvovaginal glands.

Imperfect or unsatisfactory copulation is a prolific source of disease. Efforts to avoid the legitimate results of copulation, like all violations of nature's laws, visit their penalty upon both the offenders, but most heavily upon the woman.

214. **Fecundation.**—The union of the spermatozoid with the ovum and the successful fertilization of the latter are known as fecundation. Its occurrence does not require that the woman

should share in the pleasurable sensation of copulation; indeed, it can follow in spite of the fiercest resistance upon her part. The spermatozoids, the active fertilizing agent from the man, require no assistance from the woman, but by a vermicular motion can make their way to the ovum in the internal organs.

There has been much discussion over the probable point at which the fertilization occurs—as to the ability of the spermatozoa to penetrate the narrow isthmus of the Fallopian tube against the waving cilia, the function of which is to promote a current toward the uterus. The demonstration that they do overcome these obstacles in the sheep and other lower animals, and are found swarming over the ovary, and the frequent occurrence of ectopic gestation in the woman, should be accepted as a sufficient demonstration that they make the voyage. It is most probable that fecundation results in the tube, from which the vitalized ovum passes into the uterus, which is prepared for its reception.

Impregnation is more likely to occur during or immediately following menstruation; less likely, immediately preceding the flow; and the woman is least susceptible in the mid-interval.

Independent of organic conditions, there is a marked difference between individuals as regards their susceptibility to impregnation.

MALFORMATIONS.

215. Classification.—A malformation is any deviation from the normal in the form or structure of the genital organs. Malformations are divided into those which arise from defects in the processes of development, hence known as *congenital*, and lesions resulting from traumatisms, such as laceration of the perineum, vagina, or cervix, fistulæ and atresiæ, partial or complete, which may take place as a result of labor or from other causes, and consequently denominated *acquired*.

I prefer to depart from the usual custom and to treat injuries of the perineum and cervix as well as vaginal fistulæ under this subdivision.

216. Development of the Genito-urinary Organs.—Some knowledge of the origin and processes of development of the organs is necessary to a proper understanding of the conditions in which they have failed to attain the normal. The embryonic period may be divided into five periods or stages.

The first period extends to the eighth week. Up to the fifth week from fecundation there is developed no sexual indication. The primordial kidney, the Wolffian body, the duct of Müller, and the Wolffian duct, from which the genital organs are to be developed, exist one upon each side of the median line. A cloaca exists at the site of the future vulva, into which open the urachus and intestine. From the external surface of each Wolffian body develops a structure known as the genital gland, which subsequently becomes either the testicle or ovary. Simultaneously, the cloaca is divided by a projection, the genital tubercle, which is marked by the genital furrow or groove. Their existence at the eighth week affords no information as to the probable sex.

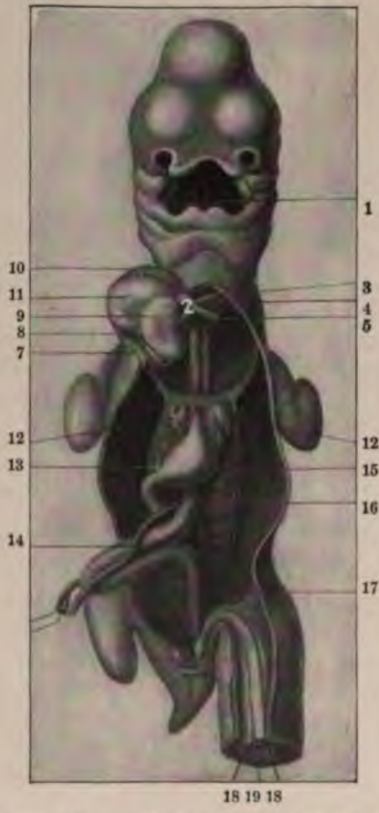


Fig. 132.—Human Embryo at End of Thirty-five Days.—(*Coste.*)

1. Tongue. 2. Aortic bulb. 3. First permanent aortic arch. 4. Second aortic arch. 5. Third aortic arch, or ductus Botalli. 6. The two filaments to the right and left of this figure are the pulmonary arteries. 7. The trunk of the superior vena cava and the right azygos vein. 8. The common venous sinus of the heart. 9. Left auricle of the heart. 10. Right ventricle. 11. Left ventricle. 12. Lungs. 13. Stomach. 14. Left omphalomesenteric vein. 15. Wolffian body. 16. Right omphalo-mesenteric vein. 17. Intestine. 18, 18. Umbilical arteries. 19. Umbilical vein.

The Second Period (Eighth to the Twelfth Week).—The Müllerian ducts coalesce, and the septum disappears in their lower two-thirds, while the insertion of the round ligament indicates the point of division between the tube and the uterus. The cloaca, by the development of the perineum, is divided into two portions—the urogenital sinus and the anus.

The third period (twelfth to twentieth week) witnesses the fusion of the uterine horns; the appearance of the arbor vitæ in the cavity of the uterus; the formation of the cervix; enlargement of the perineum; and development of the vagina, which opens into the urogenital sinus and forms the vestibule of the vagina, in which the hymen appears. The genital tubercle, which has been large, is reduced to the proportions of the clitoris, and the edges of the genital fissure become the nymphæ.

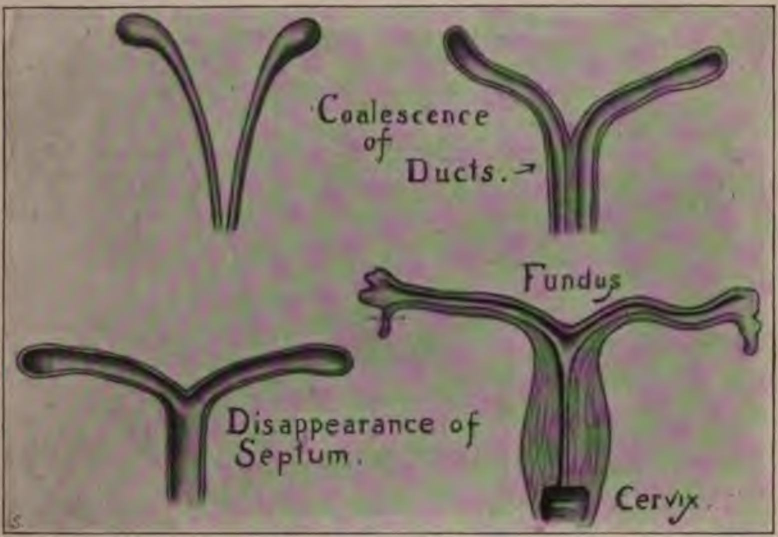
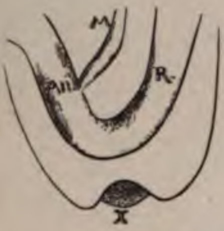


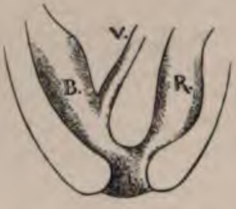
Fig. 133.—Coalescence of Müller's Duct.

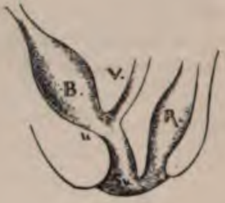
The fourth period extends from the twentieth week to the end of fetal life. During this period the fundus of the uterus increases in size; folds form in the vagina, as well as in the cervix, and the labia majora become fuller and more rounded.

The fifth period comprises the time from birth until puberty. The uterus increases in size and thickness; the uterine mucous membrane, which up to the sixth year is folded like that of the cervix, becomes smooth. The vagina is elongated and the vulva is larger and more rounded.

217. **Bifidities.**—The uterus and vagina having developed from the fusion of the Müllerian ducts, any occurrence which arrests or renders incomplete this process must lead to the development of two canals. This bifid development may be either equal or unequal upon the two sides.







Progress of Development of the Genitalia.

Fig. 134.—All. Allantois. R. Rectum. M. Muller's duct. X. Indentation of the skin which forms the anus.—(*Schroeder.*)

Fig. 135.—Cl. Cloaca. B. Bladder. R. Rectum. V. Vagina.—(*Schroeder.*)

Fig. 136.—Su. Urogenital sinus. R. Rectum, separated from the former by the perineum. B. Bladder. V. Vagina. u. Urethra.—(*Schroeder.*)

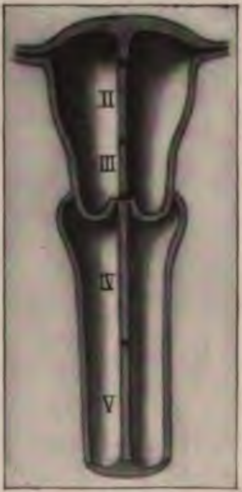


Fig. 137.—Degrees of Division of the Genital Tract.

The double development of the two canals may occur in the form of a simple partition through what seems one body, or there may be a more or less distinct division into two separate bodies.

218. Degrees of Division.—Uterus divided by partition, or *uterus septus*, may consist of five degrees. In the *first* there will be a mere outline of a septum projecting from the body. This condition is rarely recognized during life, unless opportunity is afforded for digital exploration of the uterine cavity. The *second degree* presents a septum through the body to the internal os. This form may be recognized following delivery or abortion, but may give no indication of its presence. The occurrence of pregnancy may lead to its destruction. In the *third degree* the septum extends through the body and cervix, dividing the organ into two canals. The *fourth degree* consists of a septum, which is incomplete only in the vagina, and the *fifth* presents a complete uterovaginal septum, dividing it into two canals. The one canal may be readily overlooked, or coition may occur in either side indifferently.

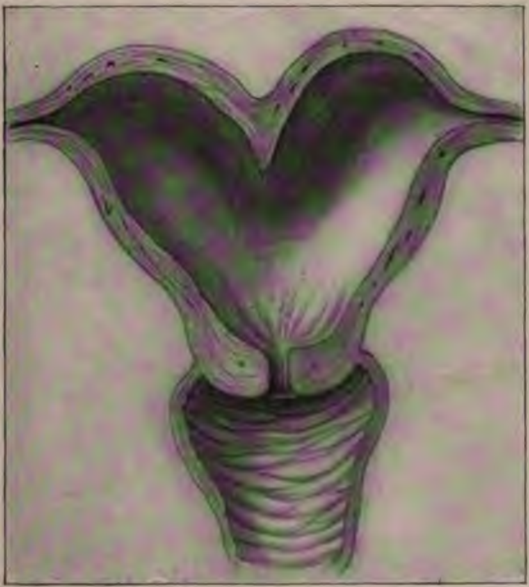


Fig. 138.—Uterus Bicornis.

219. Double Uterus.—The division of the organ into two portions may be more or less complete, and consequently may form three classes:

First, the division of the fundus by a groove and two lobes, known as the uterus bilobularis, uterus bicornis arcuatus, or uterus bicornis unicollis, the latter especially when but one cervical canal exists.

Second, the body divided into two distinct portions, the double uterus bicornis (Barnes), uterus bifidus; it may have a single or two cervical canals.

Third, two separate organs exist, each with one tube and ovary, uterus didelphys. The bodies diverge, each half being held to the corresponding side by the short broad ligament.

220. Unequal Development of the Two Sides.—The two canals of Müller are incompletely developed, and produce asymmetric organs of varying form. The one canal may be completely atrophied, with the presence of one well-developed horn —the uterus unicornis. Generally, the absence of one horn is associated with absence of the corresponding tube and ovary. The horn may be rudimentary or partly developed, permitting the occurrence of menstruation, and even pregnancy. Such a horn is not prepared for the maintenance of the fecundated ovum to the completion of gestation, and results in rupture before the sixth month. The occurrence of such a pregnancy is quite as dangerous to life as a tubal gestation, from which it can not, prior to operation, be differentiated. *Atresia* of a portion of the canal of the rudimentary or partly developed horn may exist, and may lead to an accumulation of menstrual secretion and

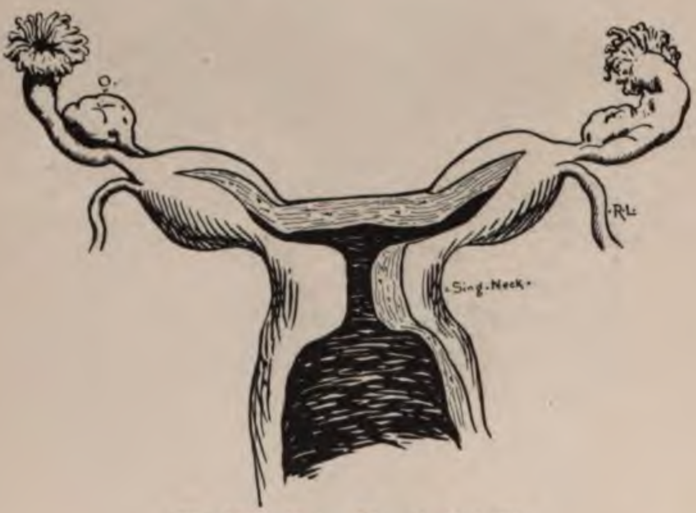


Fig. 139.—Uterus Bicornis Unicollis.

to the formation of a tumor. The diagnosis of such a condition is exceedingly difficult, and may be determined only during an operative procedure. The accumulation may rupture into the vagina, but usually at such a height as to leave a portion of the sac dependent, which is not drained, and is likely to become infected and to lead to septicemia. When the condition is determined, the treatment should be that for retained menstruation, to be described later. Development of a one-horned uterus may be associated with duplicity of the cervical canal,—*uterus biforis*,—a condition which may afford embarrassment during labor. The septum when discovered may be pushed to one side, or, if necessary, may be cut between two sutures (Pozzi). When torn, it has given rise to severe hemorrhage.

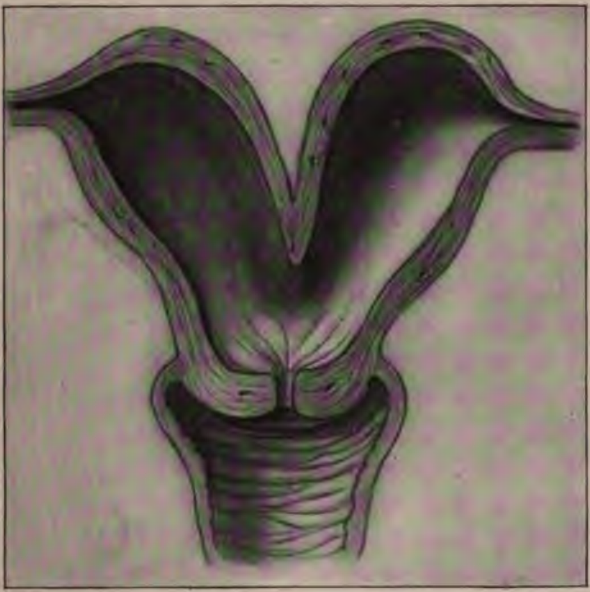


Fig. 140.—Uterus Bifida.

221. Absent Uterus.—Entire absence of the uterus is rare, and is almost always associated with absence of the other genital organs, particularly of the vagina. The determination of the condition is difficult.

The introduction of the index-finger of one hand into the rectum, and of that of the other or of a catheter into the bladder, enables us thoroughly to explore the pelvis. Failure to determine the organ may be caused by its rudimentary condition or its displacement to one side, and we can assert its entire absence only when we have been able to explore the pelvis in an abdominal section or during an autopsy.

222. A rudimentary uterus may exist in the form of slight thickening over the surface of the bladder, as two undeveloped canals in the form of a T,—the *uterus bipartitus,*—when the vagina is frequently absent or may be partly developed, deepened by coition, or may present as a small culdesac continuous with the urethra, which has been dilated by repeated efforts at coition. Menstruation is generally absent; ovulation may occur without molimina, or there may be the occurrence of hematometra.

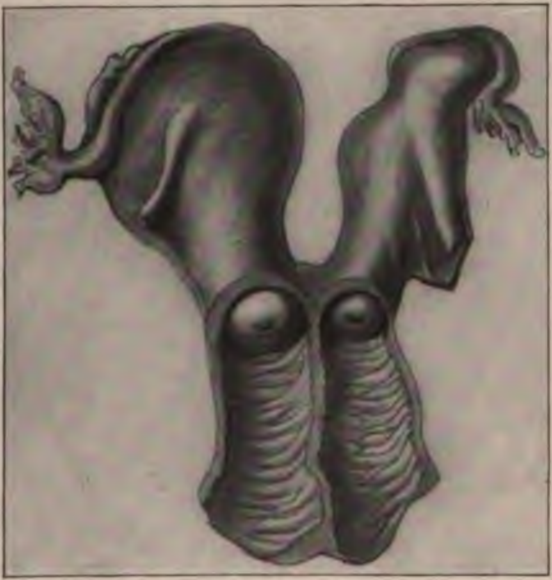


Fig. 141.—Uterus Didelphys.

When the vagina is well developed and menstruation occurs, the condition may remain undiscovered. The rudimentary character of the organ can be determined by bimanual palpation or by palpation from rectum and bladder, as has been described. The occurrence of painful molimina may require castration.

223. Fetal and infantile uteri present cases in which the organ is arrested in the fifth stage of its development. The organ is small, the cervix two or three times the length of the body, and an acute anteflexion of the body probably exists.

The infantile uterus differs from the fetal in that the arbor vitæ arrangement of the mucous membrane no longer extends to the fundus. Menstruation rarely occurs, and sexual desire may be absent. The external genitals may be poorly or well developed. The breasts not infrequently are normally developed.

224. **Congenital prolapsus uteri** is an exceedingly rare condition, and is usually associated with other forms of defective development, as spina bifida.

225. **Accessory or trifid uteri** have been reported. Hollander, in 1894, found a second uterus lying in front of the normal organ, between it and the bladder. It was a simple cervix with two orifices, having neither adnexa nor round ligaments. Depage describes a trifid uterus which probably arose from a diverticulum of one of the ducts of Müller.

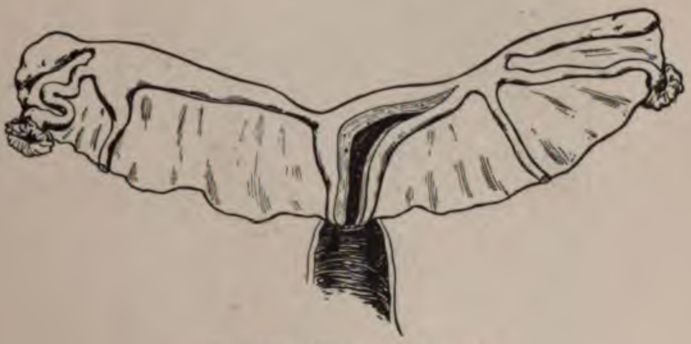


Fig. 142.—Uterus Unicornis.

226. **Absent or Rudimentary Tubes.**—Absence of the Fallopian tubes is a rare occurrence, and is associated with a similar condition of the ovaries and uterus. The absence of one tube is of more frequent occurrence; a unicornate uterus is generally found. A rudimentary tube is generally the result of an attack of fetal peritonitis. The tube may be a simple cord and yet have well-developed fimbria. The fimbria may be independent of the openings.

227. **Accessory tubal ostia** are frequent. Ferraresi found six openings upon one tube, all of which were surrounded by fimbria. These openings are generally near the end, but may occur near the middle of the duct. They are probably due to failure in closure of the groove in the germinal epithelium or to splitting of the Müllerian duct after it has closed.

228. Anomalies in Length.—The normal tube is from ten to twelve centimeters long in ovarian or broad ligament cysts, and in ovarian hernia one tube may be found from sixteen to eighteen centimeters long.

229. Absent or Rudimentary Ovaries.—Absence of ovaries is an exceedingly rare condition, requiring an inspection of the abdominal cavity to confirm the suspicion. Absence of one is less rare, and is associated with a unicorn uterus, and occasionally with absence of the corresponding kidney. The rudimentary state is more frequent, and may be fetal or adult. It may contain no glandular tissue, or the presence of unclosed Pflüger's tubes may lead to a suspicion of a testicle. The condition may be produced by oophoritis or peritonitis during fetal or adult life, or by the twisting of a pedicle.

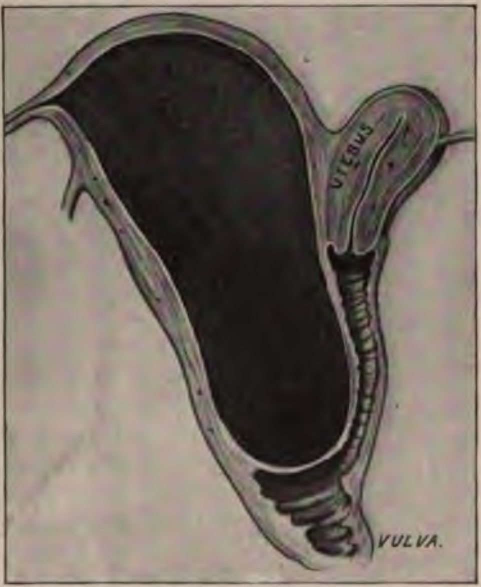


Fig. 143.—Atresia of Rudimentary Horn with an Accumulation of Menstrual Blood.

230. Supernumerary ovaries are very rare. Von Winckel found a third ovary in front of the uterus. Tufts of ovarian stroma have been described. The occurrence of menstruation, and even of pregnancy, after the supposed removal of both ovaries has been reported, but it is more than probable that in all such cases there has been failure to remove the entire structure of both glands.

231. Accessory or constricted ovaries are more frequent. A portion of the ovary may depend from the main body by a more or less well-marked pedicle; as many as two or three have been found associated with one ovary.

232. Displacements.—The descent of the ovary may have occurred, and the organ may be situated above the brim of the pelvis. The presence of the ovary in the sac of a hernia is a lesion often difficult of accurate recognition and productive of serious distress.

233. Defects of Round or Broad Ligaments.—Absence of the round ligament is generally associated with absence of uterus in whole or in part. The author has seen one case in which the muscular structure of the round ligament was completely absent. The fold of the broad ligament, in which the round ligament would lie, presented a thin, corrugated margin. The persistence of the canal of Nuck results in the formation of a hydrocele, which may attain to considerable size in the labia majora. The broad ligaments may be absent, extremely short, or unequal in length and thickness. They may contain cysts, which are relics of the parovarium.

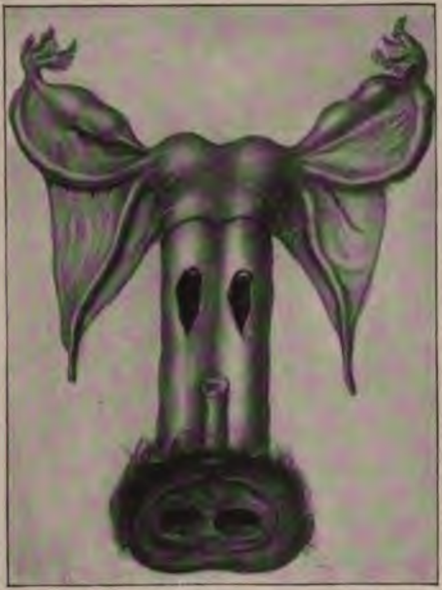


Fig. 144.—Uterus Bipartitus or Duplex.

234. Complete Absence or Rudimentary Development of the Vagina.—In complete absence of the canal no trace of vaginal tissue will be found between the rectum and the bladder. These two organs lie in contact, with connective tissue only intervening. In the rudimentary vagina a fibrous cord may exist, indicating the site of the ducts of Müller, the development of which has been arrested in an early stage of fetal life. We may have a complete absence of one of the segments of the vaginal canal, with an incomplete development of the other. In these cases of absent or rudimentary vagina the uterus is generally entirely absent or is reduced to a rudimentary nodule. In some cases normal ovaries are present without any menstrual molimina. Occasionally, there are periodic pains at the times of ovulation. Cases have been reported of vicarious hemorrhages from different portions of the body, associated with extreme pains at the supposed menstrual periods, when a well-formed uterus was present. The vulva may also be absent, but is more frequently well formed, presenting a funnel-shaped depression behind well-developed nymphæ. The hymen may be perfectly normal and the urethra at times may be dilated by the efforts that have been made to effect coition. It is difficult to

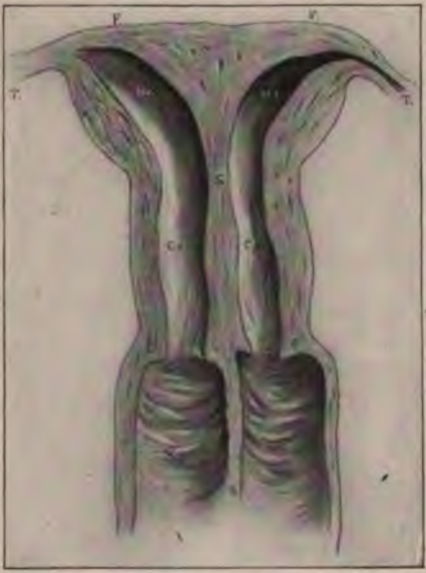


Fig. 145.—Uterus Biseptus.

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determine why it should be the lower portion of the vagina that most frequently exists in cases of arrested development. It is probably an abnormal elongation of the vestibular canal. This pouch, in the absence of the vagina and uterus, has been found to be two or three centimeters in length and sufficiently wide to admit the finger. These dimensions are very considerably increased by sexual efforts. The opening is generally closed by a pearly, reticulated membrane with a cicatricial appearance. The central portion of the vagina may be absent, or the two portions may be separated by a membrane of variable thickness, which at times is perforated. I saw one patient in whom there was a membrane dividing the upper and lower halves of the vagina, and a small opening situated at one side, which permitted the menstrual discharge to escape. The incision of this membrane ex-

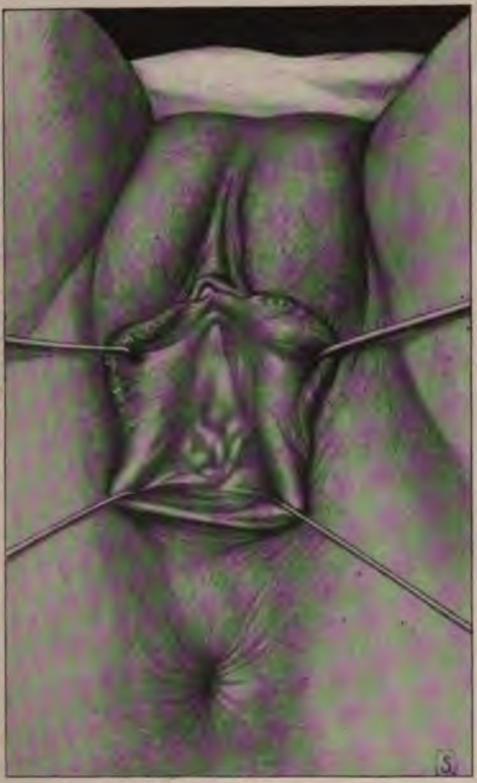

Fig. 146.—Absent Vagina.

posed a good-sized cavity above, and by cutting out a portion of this septum, the two mucous membranes of the upper and lower halves were sutured together, to form a good-sized vagina. In cases of defective vagina the examination should be practised with a finger in the rectum and a catheter or a sound in the bladder. Combined rectal and vesical touch enables us to determine the presence of the uterus and its degree of development.

Treatment.—Absence of all or a part of the vagina affords different indications according to the development of the uterus. If the latter organ is normal and the symptoms of menstrual molimina have existed, with a uterus increased in size, the presence of hematometra should be suspected, and interference should be practised. If there is no uterus, and well-developed ovaries are present, associated with painful sensations, the condition may be considered a sufficient indication for castration. If it renders the person sexually incompetent, it becomes a serious question as to whether a vagina shall be established for sexual purposes. The operation for the formation of a vagina was first performed by Amussat. The operation is performed by making an incision through the septum at the site of the vulva, using chiefly the fingers in the division of the soft parts, proceeding step by step with tearing and dissecting combined. The finger of the operator or of an assistant should be kept in the rectum and the sound in the bladder. These organs can be thus readily recognized and their injury avoided. When a depth of from six to eight centimeters has been reached, the second step of the operation should be performed, which is the investment of the funnel thus established with integument, to prevent cicatricial contraction. The skin and mucous membrane of the adjacent parts may be employed. When the labia minor exist, they may be split and utilized for the lining of the canal. After the sutures are applied the cavity

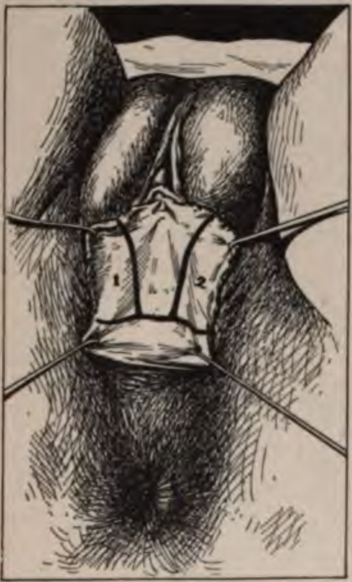

Fig. 147.—Line of Incision for Formation of Flaps.

1, 2. Flaps from labia minora which are split and used to line the vagina.

is packed with iodoform gauze, and the packing is retained or renewed until cicatrization is complete, when the canal may subsequently be kept open by a glass plug. In some cases attempts have been made to establish cicatrization over a glass plug in the newly created canal, without any attempt to line it with mucous membrane. Such a canal however, is exceedingly difficult to keep open, because it is liable to contraction even though an obturator is constantly worn. The lining of such a canal has been accomplished by following the operation by one upon another patient for redundant vagina, and utilizing the vaginal tissue removed to form a lining membrane for the newly created vagina. The tissue should be sutured over a glass plug, or, preferably, over the end of a slightly distended bivalve speculum, which is introduced into the canal with the prepared hood of membrane, and as the speculum is withdrawn, some iodoform gauze is lightly packed through it, keeping the membrane in place. During the preparation of the vaginal lining the cavity should be packed with gauze, and the packing introduced with the hood should be removed at the end of a week. If the tissues by this time have united, it should be irrigated, removing any tissue that has not retained its vitality.

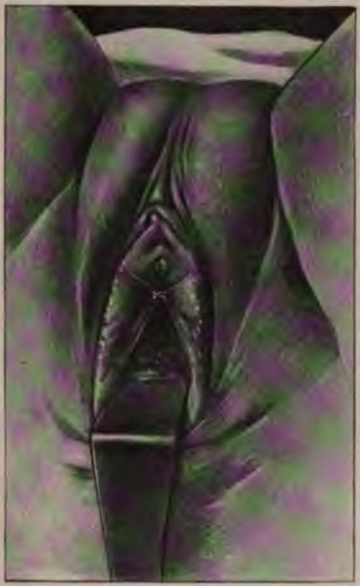

Fig. 148.—The Flaps Outlined in Figure 147 Sutured in Place.

235. Unilateral vagina is due to arrest of development in one of the ducts of Müller, the other forming the vagina. Such a condition may be suspected when the canal is extremely narrow. In cases of double vagina there may be incomplete development of one of the ducts.

236. Double Vagina.—In this condition the septum divides the entire vagina, when the uterus is also double, or divided. Occasionally, the septum in the uterus does not extend through the external os, while that of the vagina terminates below it. The hymen may be furnished with two openings, simulating double vagina. Coition generally occurs through the larger of the two conduits; occasionally it takes place in either one. When partition of the vagina is partial, the superior portion of the septum will be lacking. When the uterus is double, the upper portion of the vagina is often found to contain the septum, while fusion has been complete below. The septum is usually thick and fleshy, resembling the rectovaginal partition, or it may be very thin, and even perforated in places. Partition of the vagina is not incompatible with normal labor. Dunning has reported cases in which the two vaginæ were separated by a septum that began just above the vulva and extended to the interval between the two small cervices. The separation of the uterus into two parts was demonstrated by the use of the sound. Pregnancy occurred upon the right side, and as the uterus enlarged, the septum disappeared. During labor the vaginal portion was torn from top to bottom and only the lower portion persisted. An incomplete septum may form an obstacle to the passage of the child's head. When it does so, it should be incised. In one case under my observation there had been a vaginal septum, which was destroyed during a previous labor, and there remained a bridle extending from the anterior wall of the vagina back to the posterior commissure, which hung below the vulva.

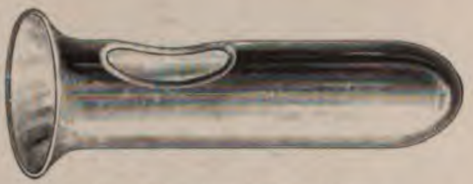

Fig. 149.—Sims' Glass Dilator.

237. Atresia of the genital canal is congenital or acquired. Congenital atresia generally occurs in the vagina or toward its orifice, at the point of junction between the vagina and the vestibular canal. Vulvar atresia is not uncommon. It may result from imperforation of the hymen, from agglutination of the labia majora, in which there is usually an orifice in front, through which urine and the menstrual flow escape, or from atresia of the labia minora. Such conditions are often unrecognized until after the establishment of puberty, when the occurrence of periodic distress in the pelvis, colic-like pains, sensation of weakness, bearing down, and irritability of temper indicates an effort to establish the menstrual flow. The continuance without discharge, and later the development of a tumor in the median line, should awaken the suspicion of the attendant to the possibility of obstruction to the menstrual discharge and of its accumulation within the genital canal. The mere inspection of

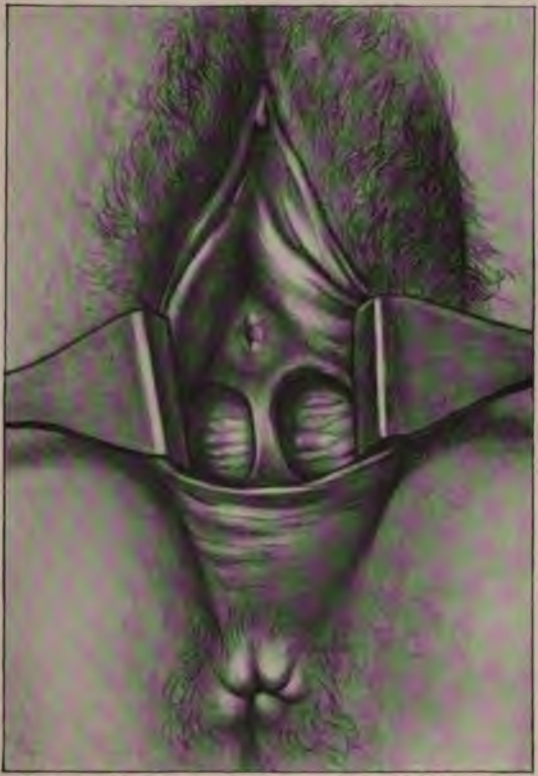

Fig. 150.—Double Vagina.—(*From photograph furnished by Dr. J. M. Fisher.*)

the parts discloses the imperforation of the hymen. There will be a tumor protruding from the vulva, possible difficulty or abnormal frequency in micturition, more or less obstruction in evacuating the bowels, and a smooth, purplish surface at the vulvar orifice. If the obstruction is situated in the vaginal canal, the vulvar protrusion will not be so marked. The introduction of the finger into the canal, however, discloses the accumulation. It is more definitely determined by introduction of the finger into the rectum, when the globular tumor encroaching upon that organ is recognized. Pressure over the abdomen causes a sensation of elasticity or indistinct fluctuation. In the absence of the vagina the accumulation occurs in the upper part of the vaginal canal or within the uterine cavity. Accumulation in the vagina is known as hematocolpos; in the uterus, as hematometra; in the Fallopian tube, as hematosalpinx; in both uterus and vagina, as hematocolpometra; and if the extension involves also the tube it then becomes a hematocolpometrosalpinx.

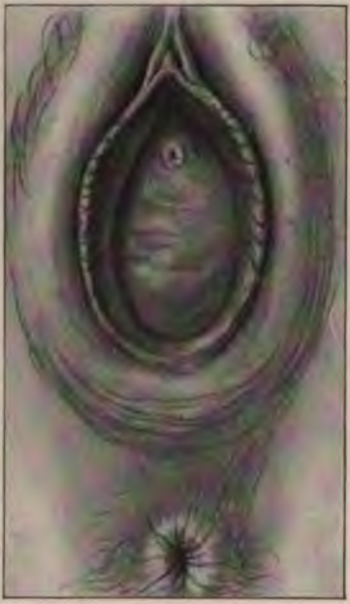

Fig. 151.—Imperforate Hymen.

Acquired atresia results most frequently from injuries during the process of parturition. Long-continued pressure by the head of the child upon the vaginal wall causes superficial sloughing and subsequent adhesion of the surfaces, producing obliteration of the canal. Such sloughing and adhesions occur either in the vagina or in the cervical canal, and involve either the external or the internal os. The symptoms are similar to those which occur in the congenital form, such as absence of menstruation, recurrence of menstrual symptoms, and the formation of a pelvic tumor. The condition of the vagina is recognized without difficulty; also of the uterus when the cervix is obliterated at the external os. When the obliteration occurs at the internal os, however, with a normal cervix, the condition becomes more difficult to recognize. It can then be mistaken for a fibroid growth of the uterus, for malignant disease, or for pregnancy. The history of the case, associated with careful examination, should afford a reasonable suspicion of its character.

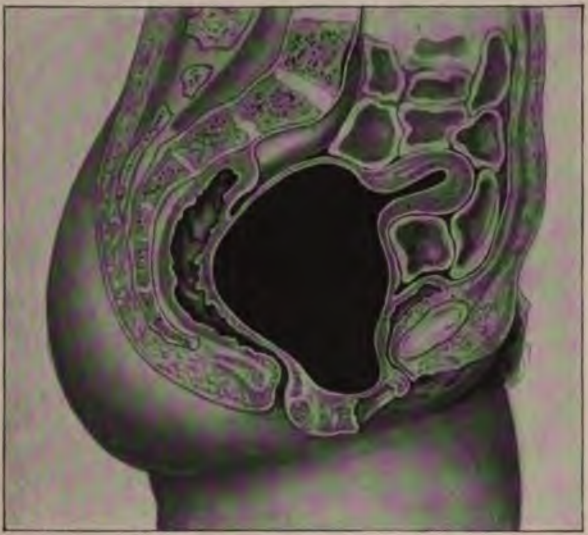

Fig. 152.—Hematocolpos. m

Treatment.—Operators were formerly very much averse to evacuating the fluid of such a collection. The fluid is thick, chocolate colored, and quite slimy, the latter due, of course, to the retention of the blood and mucous secretions of the canal. It was advised that a small pinhole orifice should be made through the opening in the hymen, to allow the discharge to evacuate slowly—over several days. Such a procedure almost surely resulted in infection of the material and produced an inflammatory condition of the genital canal, which not infrequently caused the death of the patient. The enormous distention of the tissues renders them extremely anemic, and the removal of the pressure naturally permits an engorgement, which can readily result in inflammation. The most satisfactory method of treatment, however, consists in making a free incision and evacuating the cavity, using the finger to remove the stringy mucus; then thoroughly irrigating with a weak antiseptic solution, preferably mild bichlorid solution (1 : 4000) or formalin (1 : 1500 to 1 : 2000). A large quantity of the solution should be employed, the irrigation to be followed by a douche of a normal salt solution. The cavity should then be lightly packed with iodoform gauze to afford a moderate pressure upon the surface, to prevent engorgement, and to give the structures something upon which to contract. When the accumulation occurs above an obliterated or absent vagina, a trocar can be employed to reach the fluid, guarded through the intervening structures by a finger in the rectum. The opening made by the trocar is then enlarged, permitting a free evacuation and the treatment already employed. When the accumulation occurs in the uterus from obliteration of the external os, it will often be difficult to determine the site of the os. The cervix should be exposed, and if we can not determine the

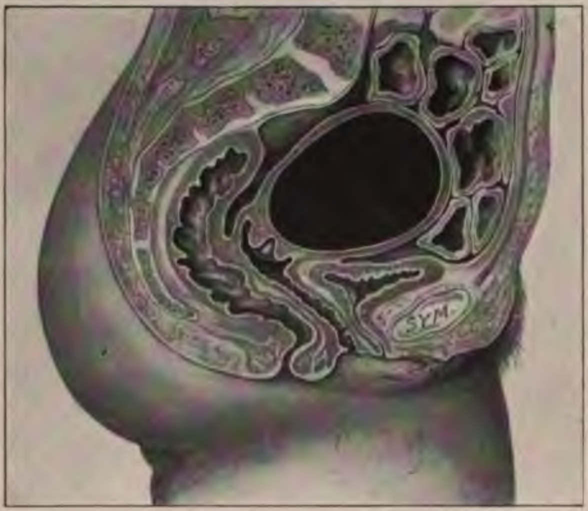

Fig. 153.—Hematometra.

situation of the former os, a puncture should be made with the trocar, which opening should subsequently be enlarged, in order to permit the evacuation of the uterine contents. The cavity is then irrigated and is packed with gauze. If the obliteration has occurred at the internal os, the remaining cervical canal affords a passage through which the puncture may be safely made. The canal having been dilated, and the cavity thoroughly irrigated, the latter should be lightly packed with gauze.

The one element of danger in these operations occurs when the Fallopian tube is distended by an accumulation and fixed by extensive adhesions. The dragging upon the thin tube which occurs from the contraction of the empty uterus may cause its rupture and the escape of its contents into the peritoneal cavity. Extreme care should be exercised in a hematosalpinx not to make much pressure upon the abdominal surface while the sac is being emptied. Whenever the sac has disappeared with insufficient discharge from the uterus, or when it has disappeared before the opening into the collection has occurred, an immediate abdominal incision should be made to cleanse the peritoneum and remove the offending sac.

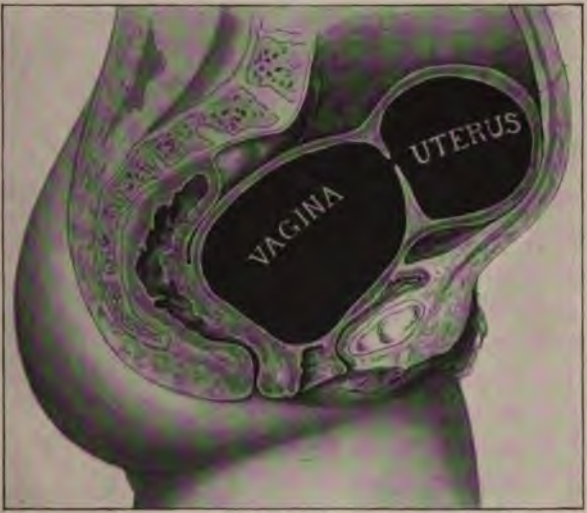

Fig. 154.—Hematocolpometra.

238. Lateral Atresia.—Atresia may occur in one-half of a divided vagina or uterus. When it occurs in a portion of the vagina, a lateral tumor will project into the vaginal canal, which will be so elastic and obscure as to render doubtful the fact whether it is a pelvic cyst or a lateral hematocolpos. Such cases are less dangerous than atresia of the entire half of the vagina, as the accumulation will probably rupture into and discharge through the existing vagina. The opening, however, will be high, permitting serious symptoms from infection and the development of a pyocolpos. The cavity should be opened by free incision, thoroughly irrigated, and packed with iodoform gauze. When the atresia has occurred in one-half of the uterus, the diagnosis is difficult. It is not always situated to one side of the developed horn, but may curve about it. The accumulation may then be accessible to the vagina, or may be exceedingly difficult to reach. When accessible, it should be opened through

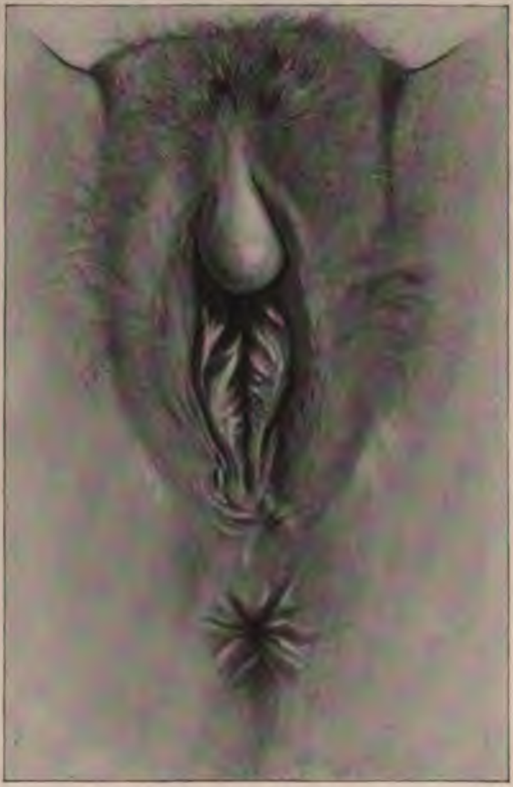

Fig. 155.—Enlarged Clitoris.

the vagina. When thus inaccessible, the tumor should be removed by an abdominal incision, as for pyosalpinx.

239. **Absence of the vulva** is generally associated with a similar condition of the vagina and uterus, although this defect may exist with a normal development of the other genital organs. It then probably results from coalescence of the labia majora. The latter are generally absent in exstrophy of the bladder, and may also be found so in other malformations. The nymphæ can be absent and the clitoris so imperfectly developed that the site of the vulva presents a mere slit or flattened surface, upon which the urethral orifice opens.

240. **Infantile vulva** is found in weak, sickly women, who have suffered from prolonged ill health prior to puberty, and is generally associated with an imperfect development of the uterus and tubes. The mons veneris and labia majora will be bereft of, or sparsely covered with, hair.

241. **Defects in Nymphæ.**—Absence of the nymphæ is infrequent, and is accompanied by incomplete development of the clitoris. *Hypertrophy* of the nymphæ is much more frequent. The nymphæ project beyond the labia majora; in the Bushwomen of Africa they form large folds, which reach nearly to the knees, and are known as the Hottentot apron.

242. **Defects of the Clitoris.**—The clitoris may be so enormously developed as to cause the sex of the individual to be questioned. In exstrophy of the bladder and absence of the symphysis it may be bifid or rudimentary. It is rarely absent. Frequently, from congenital conditions or from neglect of cleanliness, the smegma is retained beneath the prepuce, producing such irritation and adhesions that the glans clitoris is compressed and prevented from attaining its normal size. The adhesions become so firm as to render their separation difficult. The existence of adhesions and the retention of smegma are capable of producing quite as marked nervous phenomena as the analogous condition in the male, some of which are irritable bladder, nervous disturbances, masturbation, absence of sensation, and convulsions. The occurrence of such symptoms should direct attention to the clitoris as a possible cause.

Treatment.—The glans clitoris should be thoroughly exposed by pushing back the prepuce. The adhesions can readily be broken up with a probe or a grooved director. When the prepuce is so long as to form a hood and completely envelop the glans, it should be retracted by removing an elliptic piece of integument about half an inch above the clitoris, with the long diameter of the ellipse parallel to the cleft of the vulva. This denuded portion should be closed by sutures introduced in its long axis. The length of the denudation necessary depends upon the projection of the prepuce. The prepuce may be dissected away and the cut edges sutured so that the glans subsequently remains exposed.

243. Defects of the Hymen.—The hymen is composed of tissue analogous to the corpus spongiosum in the male. It partly closes the vaginal orifice, and has upon its superior surface the foldings of the mucous surface of the vagina. It is generally crescentic, with the concave margin anterior. It can present an annular opening; two openings, separated by a septum; or a number of openings—the cribriform. It sometimes resembles in appearance the infantile form, when it is infundibuliform, or its edges may be dentated or serrated. Its normal situation is just within the vulva, where it is exposed by separation of the labia. In the colored race its situation is higher. Its opening in the marriageable woman will easily admit the tip of the finger. *Atresia* has been described. (Section 237.) *Supernumerary hymen* have been reported, but these are probably congenital bridles in the vagina. A *congenital absence of the hymen* must be questioned. The hymen is generally a thin membrane, which ruptures during the first coition and sloughs away after confinement, leaving as remnants the carunculæ myrtiformes. The laceration may be a central posterior tear, triangular, or stellate. After a single coition the torn surfaces may unite. I have seen two cases in which the hymen was so firm as to form an actual barrier to coition, requiring incision to render the act satisfactory. Cases are reported

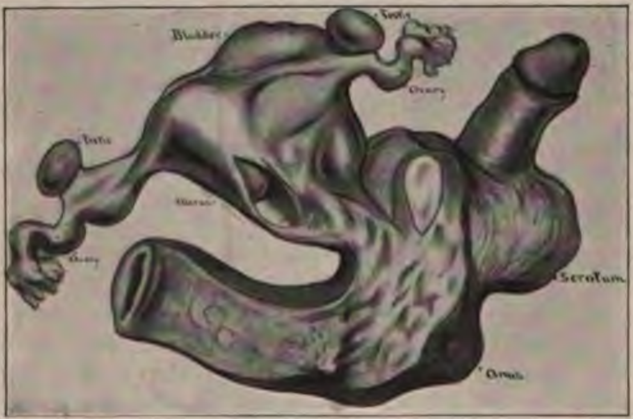

Fig. 156.—Apparent Hermaphroditism.—("*American Journal of Obstetrics.*")

where it did not rupture during labor, or offered such an obstacle to delivery as to require incision. Its laceration is not usually attended with bleeding, but occasionally its rupture is followed by severe, and even dangerous, hemorrhage.

Incision is made with bistoury or scissors, while the labia are widely separated. Two posterior lateral incisions are preferable to a single posterior. Hemorrhage, if severe, should be controlled by a vaginal tampon, or, preferably, by a suture.

244. Hermaphroditism is a condition in which there is a real or apparent union of the two sexes in the same individual. *True hermaphoditism* has not been demonstrated in the human species, although a number of cases have been reported. The case represented in figure 156 presents characteristics of the two sexes, but, like other such cases, requires a microscopic examination to demonstrate the presence of both ovaries and testicles in the same individual.

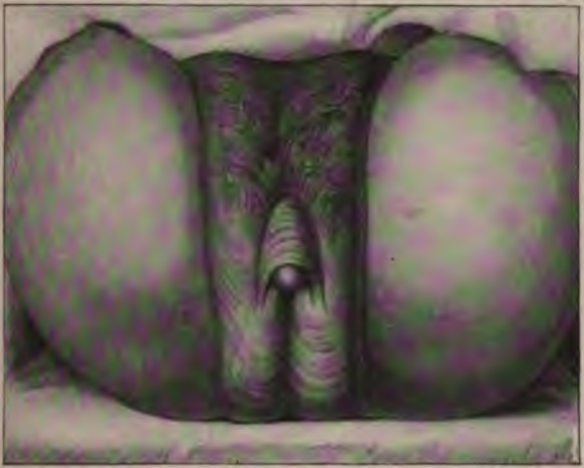

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Fig. 157.—External Genital Organs of Madame Le Fort.—(*Auvard.*)

Pseudohermaphroditism is a condition in which there is such an apparent union of the sexual organs of the two sexes, or such a malformation, or defective development of the male organs or excessive development of those of the female, as to render the determination of the sex of the individual during life difficult, if not almost impossible. Pseudohermaphroditism is divided into masculine and feminine, according to the presence of testicles or ovaries. The females resembling men form a class known as the gynandria, while the man resembling the female is classed as an androgynus.

245. Gynandria.—The external organs of the female resemble those of the male. The clitoris is large, with possible fusion of the labia majora, not infrequently of the labia minora, simulating the scrotum and concealing the vulvar opening. This resemblance is still more striking when there is associated ovarian hernia into the labium majus. The internal organs may be irregularly developed. The hypertrophy of the clitoris does not necessarily change its form, and may arise in women who are addicted to masturbation. The labial fusion may be so firm as to require incision.

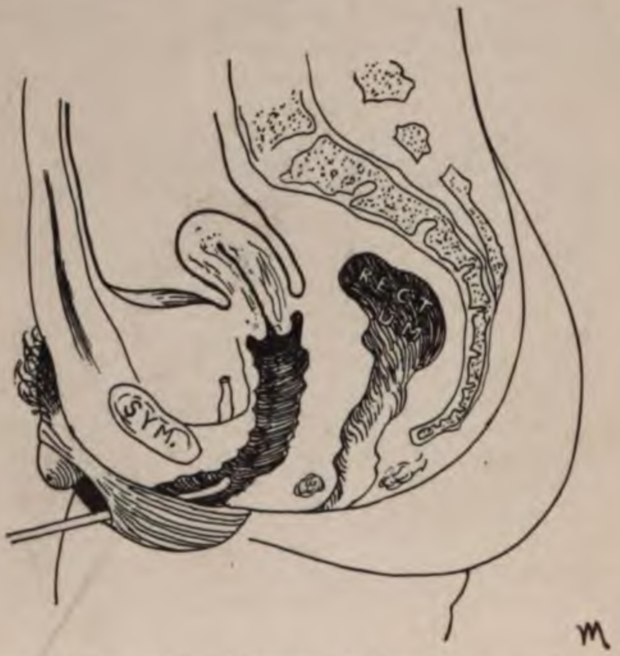

Fig. 158.—Outline of Internal Organs of Madame Le Fort.—(*Auvard.*)

An example of this class is Madeline Le Fort (Auvard), who was declared to be a female by Beclard when she was six years of age. The clitoris was very large; a groove upon the under surface led to a depressed urethra in the cleft of the vulva. The vagina was replaced by a small conduit, from eight to ten centimeters long, bordering upon a well-formed uterus. Menstruation occurred at the eighth year, and escaped from an orifice situated at the root of the clitoris. Her general appearance was strongly masculine, and she was sexually indifferent.

246. Androgyna.—This class predominates, and its individuals are frequently monorchid or cryptorchid males, presenting external characteristics of the female, such as enlarged breasts. The penis may be perfect, but the nondescent of the testicles and a median depression in the scrotum resembling the labia majora will give a distinctly feminine aspect. Arrested development of the penis, hypospadias, and fissure of the scrotum greatly increase the resemblance. Such persons are generally dressed, reared, and educated as girls, and have been married without being aware of their true sex.

The determination of sex is of great importance. It requires careful consideration of the size, shape, and general configuration of the body. The testicle may be small, and be retained within the abdominal cavity. The secretion of the semen is generally sterile. The breasts resemble the feminine, as do also the buttocks and thighs. The larnyx is not prominent and the beard is scanty or absent. The rectal touch, with the catheter in the bladder, may fail to reveal either uterus or prostate. The mental condition is generally feeble or poorly balanced. When careful examination fails to render the sex certain, the individual should be classed as a male. Independent of increased freedom and larger opportunities for acquiring a livelihood, the imperfect male is less likely to enter upon the marriage relation.

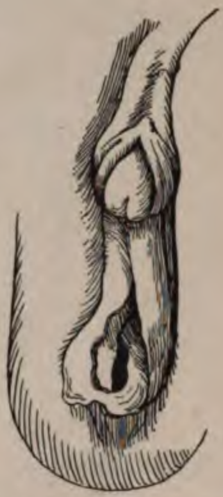

Fig. 159.—Androgyna. —(*Pozzi.*)

247. Atresia of the urethra and vagina has been noted, but such a fetus is nonviable.

248. Hypospadias is much more rare in the female than in the male. The vestibule is absent and the orifice of the urethra is not visible to inspection. Generally, the apparent hypospadias is really persistence of the urogenital sinus. The urethra can be wholly absent, and the bladder may present a crescentic opening into the vagina. It is often associated with prolapse of the bladder-wall, and incontinence is usually present.

249. Epispadias is still more rare. It presents four varieties: (1) The corpora spongiosa are separated and the urinary sinus is situated in the posterior surface of the clitoris; (2) added to the former condition, there is a partial defect of the anterior urethral wall; (3) the anterior wall of the urethra is entirely absent, the clitoris is bifid, and the labium minus is attached on either side to a portion of the glans clitoris, while the pubic symphysis may also be defective; (4) exstrophy of the bladder, in which the anterior wall of the abdomen, with that of the bladder, is absent and the posterior vesical wall protrudes. The ureters open upon the surface, and the parts are constantly soiled with urine.

The first form of epispadias is very rare, the last most frequent. While vesical ectopia is prone to result in disease and obstruction of the ureters, which lead to hydronephrosis and early death, cases have reached old age. The occurrence of epispadias and associated incontinence is not inimical to the occurrence of conception, and cases of pregnancy at full term are recorded.

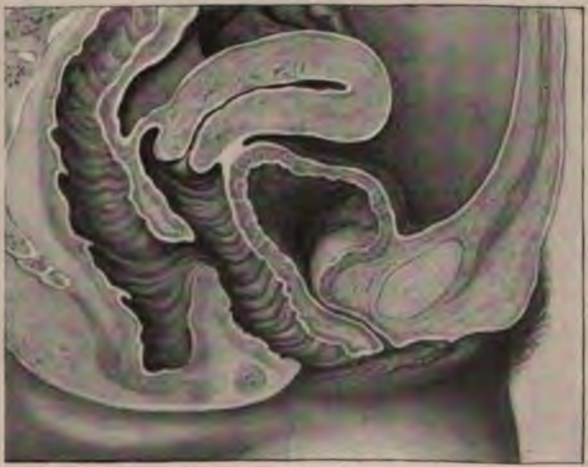

Fig. 160.—Imperforate Anus. Communication between Rectum and Vagina.

Treatment.—The urethra may be established by denuding and suturing the surfaces, but failure to secure a good result is frequent. Ectopia of the bladder is difficult of correction. It is preferable not to attempt an operation during infancy, owing to the friability of the tissues and the probability of sutures cutting through. Transplantation of the ureters into the rectum probably affords the most satisfactory solution of the problem.

250. **Duplication of the bladder** has been found associated with doubling of the genitalia.

251. Open Urachus.—Permeability of the urachus and discharge of urine from the umbilicus is a result of congenital closure of the urethra, but sometimes occurs independently. It is much more frequent in boys than in girls.

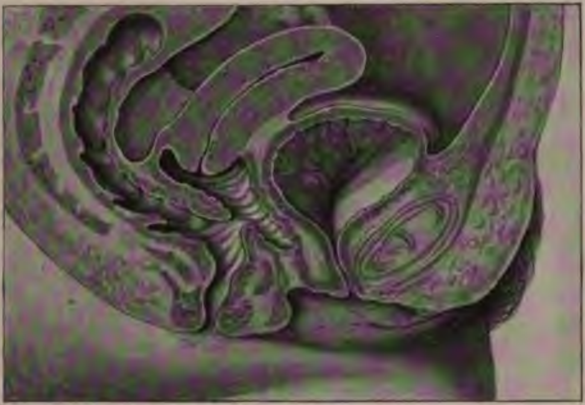

Fig. 161.—Congenital Defect of Vagina. Communication with the Rectum.

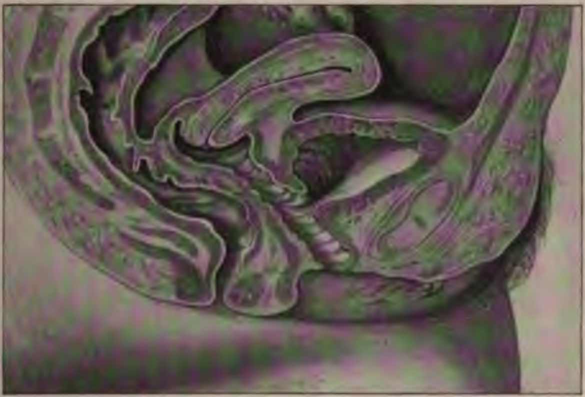

Fig. 162.—Congenital Absence of the Urethra. Communication of Bladder with the Vagina.

252. Irregular Exit of Ureter.—Opening of the ureter into the vagina has been described, but these are probably cases in which the supposed vagina is really a rudimentary bladder. I had an opportunity to examine a young woman in whom the bladder was rudimentary and the vagina formed a receptacle in which urine accumulated and prevented incontinence becoming complete. Baum describes an accessory ureter which opened at the side of the urethra. He operated by an incision above the symphysis, cutting through the bladder upon the ureter, which he divided, tying the distal end, while the other was brought into the bladder. The procedure overcame the incontinence.

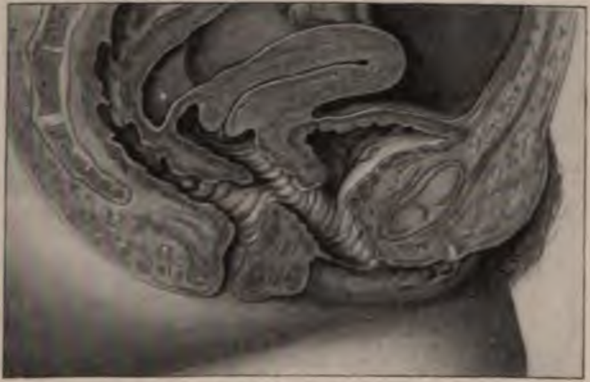

Fig. 163.—Communication of Rectum and Bladder with the Vagina.

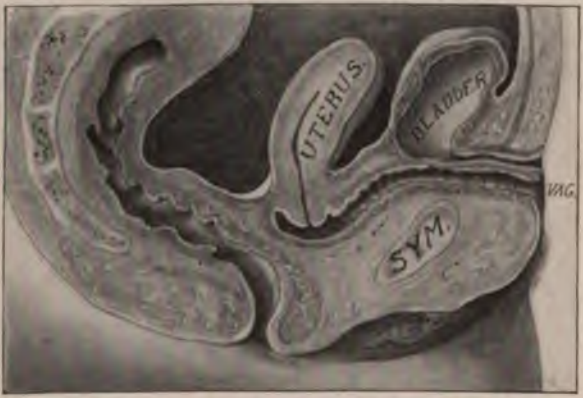

Fig. 164.—Suprapubic Opening of Vagina and Urethra.

253. Abnormal Communications.—Errors in development may produce imperforation of one of the canals which perforate the pelvic fascia or the union of two or three of them. In any case the cause is analogous: *i. e.*, failure to accomplish the union between the superficial and deep organs. Imperforations of the anus and urethra are vital, calling for prompt attention of the surgeon. Imperforation of the vagina has been considered. (Section 234.) The communications may be:

1. Rectovaginal. (Fig. 160.)
2. Vaginorectal. (Fig. 161.)
3. Vesicovaginal. (Fig. 162.)
4. Rectovaginovesical. (Fig. 163.)
5. Suprapubic opening of vagina and urethra. (Fig. 164.)

254. Fistulæ.—Abnormal communications with the genital canal produced by traumatism or inflammatory lesions are denominated fistulæ. These fistulæ are divided into urinary and fecal.

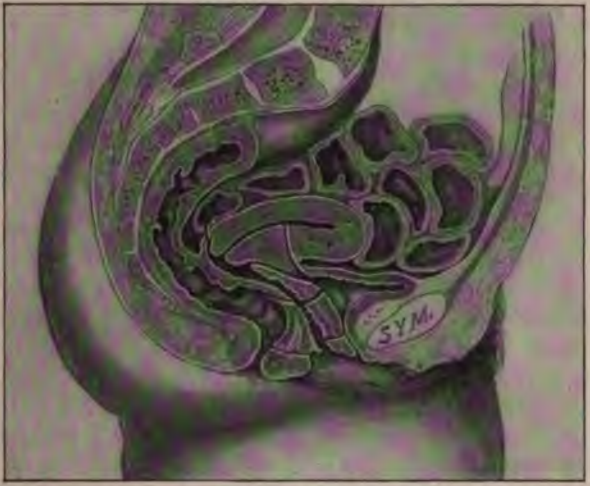

Fig. 165.—Scheme Showing Various Fistulæ.

The genito-urinary fistulæ are:

1. Urethrovaginal.
2. Vesicovaginal.
3. Vesico-uterine.
4. Ureterovaginal.
5. Uretero-uterine.

(Fig. 165.)

The fecal fistulæ are:

1. Anovulvar.
2. Rectovaginal.
3. Enterovaginal.

(Fig. 165.)

255. Etiology.—Fistulæ are most frequently caused by the accidents of labor. These lesions are of less frequent occurrence than formerly, the result of improved methods of delivery, by which the progress of the fetus is expedited and the maternal parts are saved from such protracted pressure. Fistulæ are rarely the result of tearing, but generally follow a slough from prolonged pressure. Awkward use of instruments may result in perforation of the bladder or the rectum, but such lesions present a marked tendency toward spontaneous recovery.

Other causes of fistulæ are cancer involving the anterior or posterior vaginal walls, tuberculous ulceration, surgical operations, ulceration from the presence of a vesical calculus, and abscesses or phlegmons.

256. Symptoms.—The presence of a urinary fistula is made known by incontinence of urine and by the appearance of the urine in the vagina. A fecal fistula will permit the discharge of liquid feces and gas by the vagina. A few days subsequent to confinement the patient complains of being unable to retain her urine, or possibly it may come with a gush, showing that a large slough has given way. The parts are subsequently continually bathed with urine, the skin becomes reddened and irritated, and the salts of the urine are deposited, increasing the irritation. The clothing of the patient is saturated with decomposing urine, causing a disgusting odor. Partial continence may be present when the opening is small, when it is situated high in the vagina, or when it affects one ureter and the other opens into the bladder. The influence of the fecal fistula depends upon its size and situation. A small opening may permit the escape of the contents of the intestine only when they are liquid. The odor of the vaginal secretion is exceedingly offensive, so that the patient suffers an enforced retirement.

257. Diagnosis.—Incontinence should at once awaken suspicion of fistula. Large fistulæ are readily recognized by vaginal palpation. Small fistulæ, associated with cicatricial contraction of the vagina, are often difficult to expose. The entire surface of the vagina should be exposed with retractors or with a Sims speculum under a good light. If the opening is small, it will be revealed by injecting the affected organ with milk or other colored liquid, when the opening will be seen as the liquid escapes into the vagina.

This procedure affords a means for differential diagnosis in ureteric and enteric fistulæ. The escape of clear urine into the vagina when the bladder is filled with a colored liquid demonstrates the ureter as the origin of the fistula. The introduction of a ureteral catheter into the sinus and of a sound into the bladder demonstrates the intervening septum. When the opening is so small that it is not visible, dry the surface and apply blotting-paper while the bladder is being filled. The paper will be moistened at the site of the fistula (Pozzi). In enteric fistulæ the vagina is constantly bathed with liquid feces, and the appearance of the discharge is not affected by rectal enemata. There is an offensive vaginitis and the patient suffers from inanition. In supposed uretero-uterine fistula the position of the ureters should be examined by Sanger's method. (See Section 89.) It has been suggested that the patient urinate, then sit two hours upon a vessel, when a catheter is used; and if the quantity thus secured is equal to that in the vessel, there is a ureteric fistula. The collection has been obtained from separate kidneys.

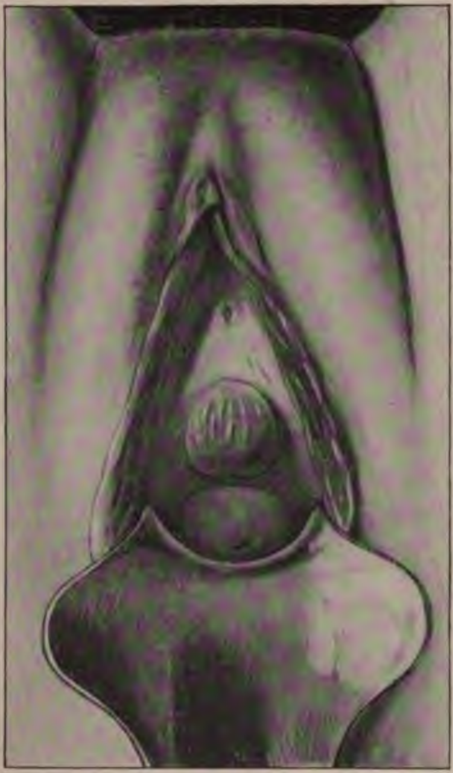

Fig. 166.—Large Vesicovaginal Fistula with Prolapse of the Anterior Vesical Wall through the Opening.

No operation should be attempted for rectal fistula without exclusion of rectal stricture.

258. Prognosis.—The curability of a fistula depends upon its cause, situation, size, and duration. Those produced by cancer are a part of the progress of the disease, and are incurable. Spontaneous recovery of punctured or incised fistula is prone to occur with cleanliness, but an old sinus with hard, cicatricial edges requires a surgical procedure. An opening into the base of the bladder is more readily relieved than one in the upper part of the vagina or than one of the urethra. Vesico-uterine fistulæ are particularly difficult, while the ureterovaginal or uretero-uterine fistula is most trying.

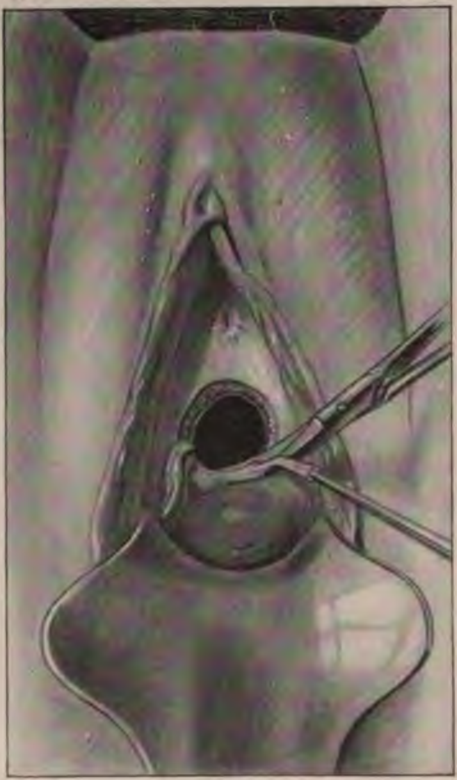

Fig. 167.—Denudation of the Edges of the Fistula.

259. Treatment.—The methods of treating vaginal fistulæ as now recognized may be considered as:

1. Cauterization.
2. Denudation and suture of the edges of the fistula.
3. Flap-splitting and suture.

4. The method of Ferguson, which he denominates flap-formation and sutures.

260. Cauterization of the fistula is applicable only to those of small size and where there is but little cicatricial tissue. The thermocautery is the preferable means, although caustic potash, chlorid of zinc, or one of the stronger acids can be employed.

261. Preliminary treatment is important, whatever the methods of operative procedure. The urine should be rendered alkaline and nonirritating by the administration of benzoin salts.

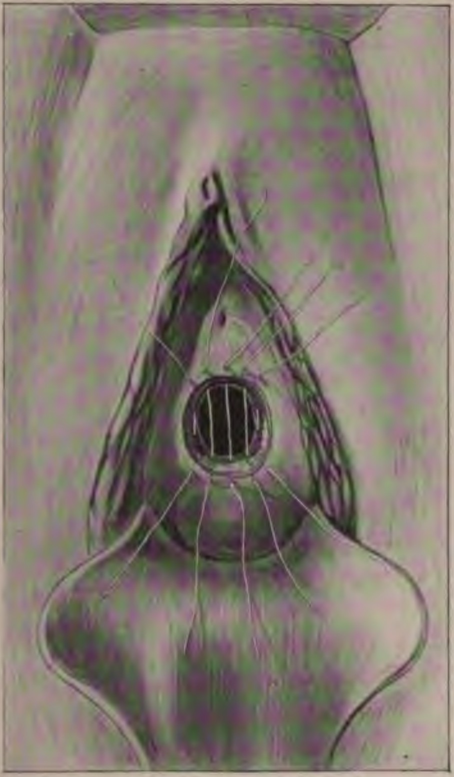

Fig. 168.—Sutures Introduced.

℞. Ammon. benzoat., ... ʒ iij
Tr. hyoscyami, ... f ℥ iss
Ext. buchu, ... ad f ℥ ij. M.
Sig.—f ʒ j in water three or four times daily.

This prescription should be accompanied by the ingestion of large quantities of water. Hot or soothing vaginal douches should be freely employed, as a solution of sodium hyposulphite (ʒiv, aq. Oj) or weak solutions of the lead salts. If there is an incrustation of the lime salts about the orifice and over the vagina, employ a solution of dilute nitric acid (gtt. j, mucilage water f℥j). Cicatricial bands should be incised and stretched; the vaginal walls should be incised, to diminish traction upon the edges of the fistula when sutured. The relaxation may be accomplished by having them heal while a Gariel pessary or a colpeurynter is worn. Bozeman employed vaginal obturators of plated copper, which, when worn, distended the vagina for operation. The intestinal canal should be thoroughly evacuated.

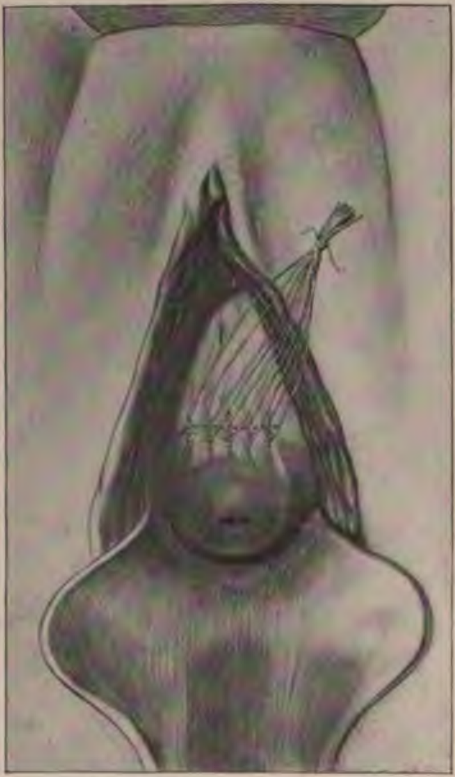

Fig. 169.—Wound Closed.

262. Vesicovaginal Fistula.—Injuries to the vesicovaginal septum are the most frequent. The operation of vivifying and suturing the edges was revived, perfected, and rendered successful by Sims. After thorough cleansing and disinfection of the vagina and the bladder, the patient is placed either in the semi-prone position, or upon her back with the limbs well flexed. The perineum is retracted and the edges of the opening are rendered tense by suitably applied double tenacula, which are held by assistants. The denudation is performed with knife or scissors, preferably the latter, as the tissues bleed less. The denudation is accomplished at the expense of the vaginal surface, exercising care to avoid injury to the vesical mucous membrane. The mucous membrane is seized with forceps at one side and the denudation is performed with the attempt to complete the circuit with the one strip. Having secured an equal denudation upon all sides, about one centimeter in width, the sutures are introduced. They are inserted about one centimeter apart, introducing and

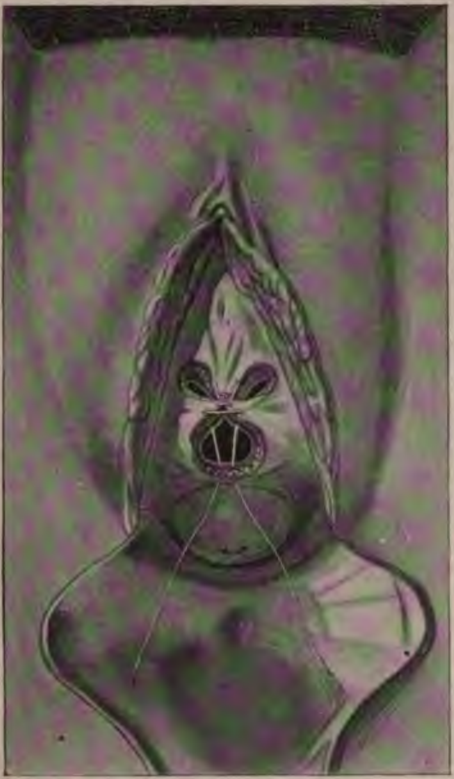

Fig. 170.—Method of Suturing to Decrease the Tension upon the Sutures.

bringing them out about five millimeters from the edges of the denudation without permitting any suture to penetrate the vesical mucous membrane. The sutures may be introduced anteroposterior, transverse, X or Y shaped, according to the opening, that direction being chosen which will produce the least traction upon the tissues. The sutures may be silk, catgut, silkworm-gut, or

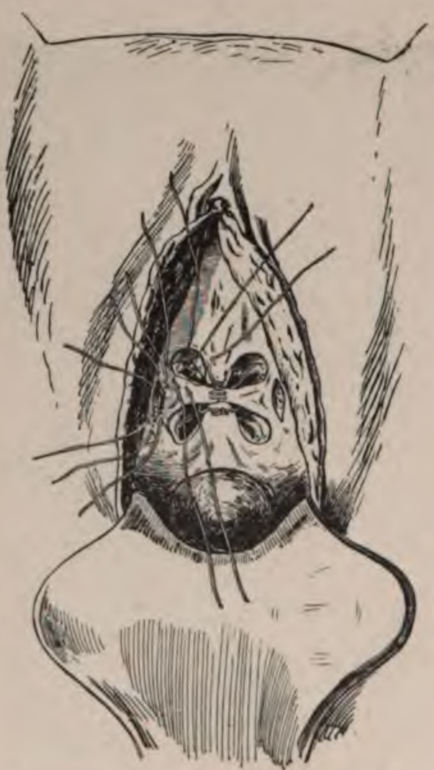

Fig. 171.—Showing Continuation of Suturing to Close Fistula with Incisions to Decrease Tension with Suture Introduced on Left Side to Close the Secondary Opening.

silver wire, preferably the latter two. After the sutures are all in place the bladder should be irrigated in order to remove all clots, and the sutures should be tied, twisted, or secured with perforated shot, exercising care not to draw them tight enough to strangulate the inclosed tissues. After securing the sutures it is well to inject the bladder, to make sure that no small opening remains. In large fistulæ care must be taken not to injure or constrict the orifice of a ureter. These canals may open upon the surface of the fistula, when the vesical surface of the ureter should be split several days before the operation and the surfaces kept open by the frequent use of a probe.

263. Flap-splitting.—The loss of structure by denudation in large fistulæ was not infrequently a serious sacrifice of tissue, and led to the practice of securing fresh surfaces by splitting the edges of the fistula. The vesical and vaginal surfaces are divided through the cicatrized margin to the depth of about three to eight millimeters, according to the thickness of the septum. When the opening is small, it can be closed by a purse-string suture. The suture of silkworm-gut or silver wire is passed through the vaginal flap within the vesicovaginal septum and brought out in the vagina directly opposite its point of entrance, reintroduced near its exit and made to traverse the

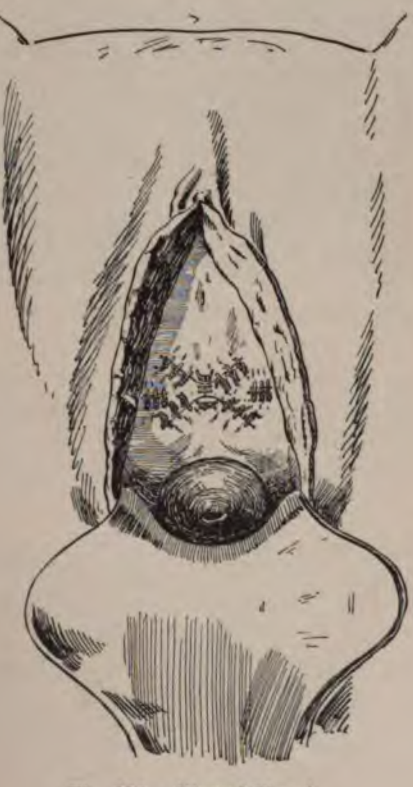

Fig. 172.—Wound Closed.

remaining side of the opening, and brought out near the original entrance. This suture, tied, turns the vaginal flap outward and the vesical inward. When the size of the opening renders it desirable to close it upon a line, the vesical flaps are preferably closed by animal sutures, as catgut. The vaginal flaps may be closed with silk or silkworm-gut.

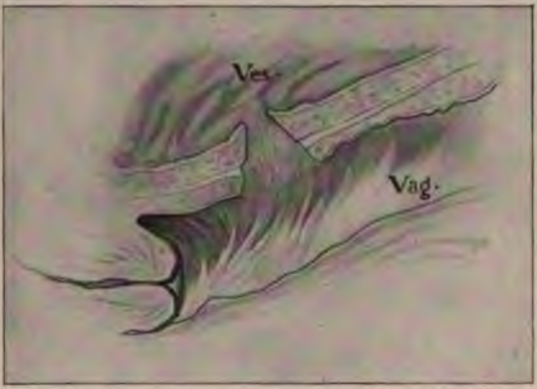

Fig. 173.—Fistula Preparatory to Splitting into Vesical and Vaginal Flaps.

Walcher advocates first cutting away the cicatricial tissue, then separating the vaginal and vesical surfaces. This procedure secures greater mobility of the internal flaps, which are closed with catgut by the Lauenstein stitch. The needle

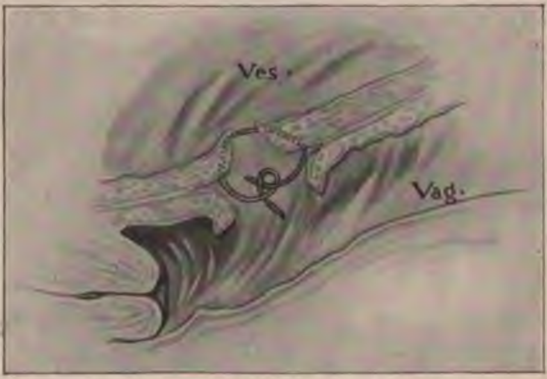

Fig. 174.—Suture Introduced in Vesical Flap.

is introduced on the raw surface and brought out on the line of demarcation, midway between the raw surface and the vesical mucous membrane, and the reverse in the opposing vesical flap. After these sutures are tied, closing the bladder, the vaginal flaps are sutured. E. R. Corson (Savannah, Ga.) expedites the formation of the flaps and the introduction of sutures by the use of a portion of an india-rubber ball. A strong silk cord is passed through the shank of a shoe button which has been made to pierce the center of a portion of a rubber-ball; this, folded, is carried by forceps through the fistulous opening.

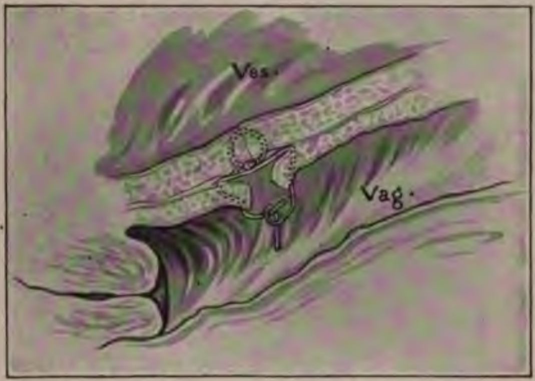

Fig. 175.—Suture in Vesical Flap, Tied. Vaginal Suture Introduced.

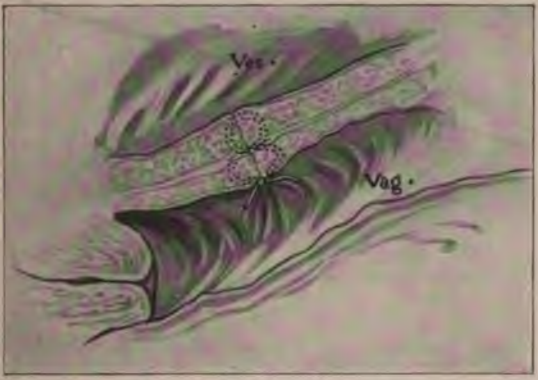

Fig. 176.—Wound Closed.

Traction upon the string draws down the opening, exposing its edges.

264. Trendelenburg's Method.—In extensive fistulæ Trendelenburg advocates making a transverse incision ten centimeters long through the abdominal walls, and a transverse incision through the bladder, just below the peritoneal junction. The upper edge of the vesical wound is temporarily stitched to the corresponding abdominal, and the lower edges of the bladder are held open with sutures. The edges of the fistula are trimmed and the sutures so introduced that their ends can be brought out and tied from the vagina. The vesical wound is closed around a drainage-tube, and gauze is placed in the prevesical space, and both are brought through an opening in the abdominal wound, the remaining portion of which is closed with sutures.

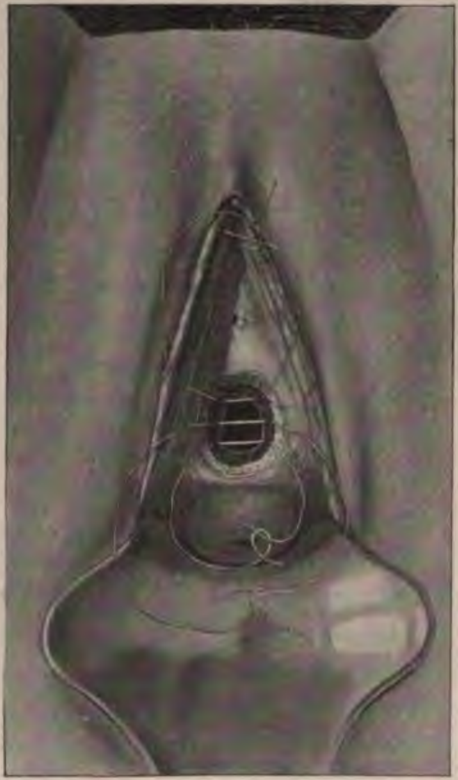

Fig. 177.—Sutures Introduced to Close Vesical Surface, as Suggested by Walcher.

265. Flap Transplantation.—Bardenhauer formed a flap by transplantation. He performed suprapubic cystotomy, and through the abdominal wound dissected the bladder away from the peritoneum as low as the fistula, separated the adhesions and cicatricial tissue, and denuded the edges of the fistula and sutured them from the vagina, while the edges of the fistula were pressed together by the finger passed into the bladder through the suprapubic wound. The wound is plugged with gauze and left open. The operation, by utilizing a vesical flap, can be performed through the vagina. The vesicovaginal septum is split and the vesical wall is extensively separated, permitting it to be drawn down to close the opening. When possible, the remaining vaginal walls should be utilized to cover the bladder surface.

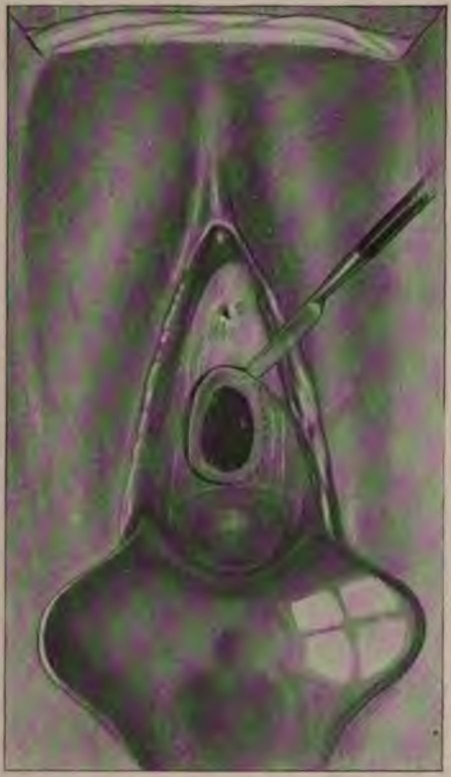

Fig. 178.—Flap-formation as Suggested by Ferguson.

266. Flap formation is a procedure originated by Ferguson, of Chicago. The fistulous opening is exposed, and an incision is made with a scalpel through the vaginal mucous membrane, three to six millimeters from the margin of the fistula. This incision completely encircles the opening and extends to, but without injuring, the vesical wall. The wound is kept free from blood by a stream of sterilized water. This procedure forms a circumferential flap, hinged by the vesical mucous membrane, which is turned into the bladder, forming a roof for the raw surface, and is held in this position by a continuous fine chromicized catgut suture, so inserted that it does not pierce the mucous wall of the bladder. The narrow strip of vaginal tissue, which, from its density, retains the stitches well, becomes a part of the bladder wall. The artificial opening is thus closed and made water-tight. The operation is completed by suturing

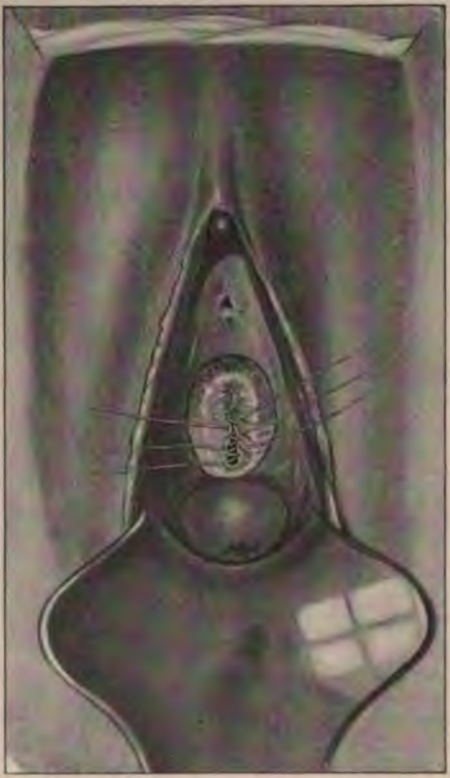

Fig. 179.—Flap Turned in and Vesical Opening Closed.

the vaginal walls with silkworm-gut or silver wire. The advantages which may be justly claimed for this procedure are that there is no loss of tissue; second, a broad surface is secured for apposition; third, there is a projection into the bladder at the site of the opening which decreases the danger of leakage and infection; fourth, in case the ureter opens into the fistula, it affords an opportunity to turn it into the bladder; fifth, it decreases the danger of primary and secondary hemorrhages; sixth, in large openings it affords the best opportunity to secure relaxation by incision or sliding flaps; seventh, it is applicable to fistulæ of bladder, urethra, or rectum.

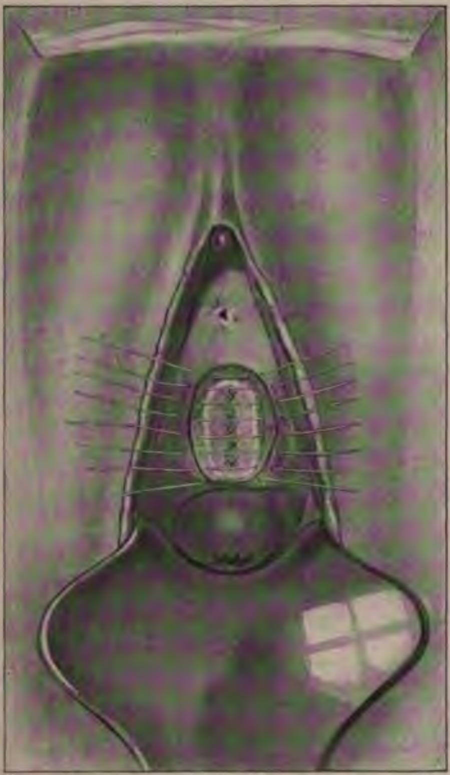

Fig. 180.—Introduction of Vaginal Sutures.

267. **After-treatment.**—The vagina, thoroughly cleansed, should be lightly packed with iodoform gauze, which should remain for two or three days. A rubber catheter, ending in an

internal plug which will permit the urine to flow gradually and will exclude the entrance of air, should be placed in the bladder. It should be removed at the end of eight days, and subsequently, for the next eight days, a catheter should be used four times daily. The vagina should be irrigated with an antiseptic solution twice daily after the third day, and this should be continued for the greater part of three weeks. The sutures should be removed on the fifteenth day.

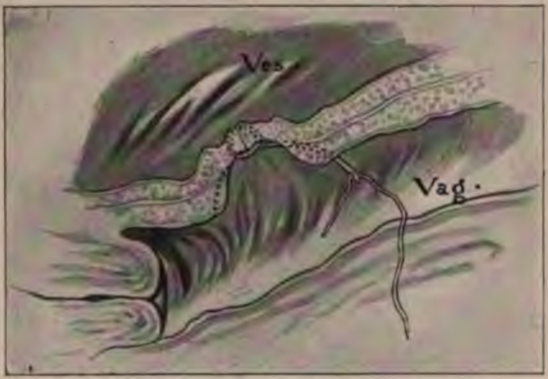

Fig. 181.—Section Showing Projection upon Vesical Surface.

268. Closure of the Vagina.—Colpocleisis.—Episiostenosis.—Large fistulæ in which the base of the bladder is destroyed may be obliterated indirectly by closure of the orifice of the vagina, thus making that canal a part of the reservoir for urine. A ring of tissue two centimeters broad is removed from the vaginal orifice. In the dissection the parts should be kept on the stretch and the tissue should be dissected from above downward, while a sound in the urethra and a finger of an assistant in the rectum will greatly facilitate the denudation of the anterior and posterior walls of the vagina. The sutures should be passed from

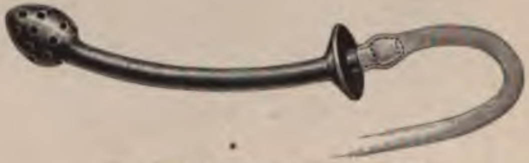

Fig. 182.—Self-retaining Catheter.

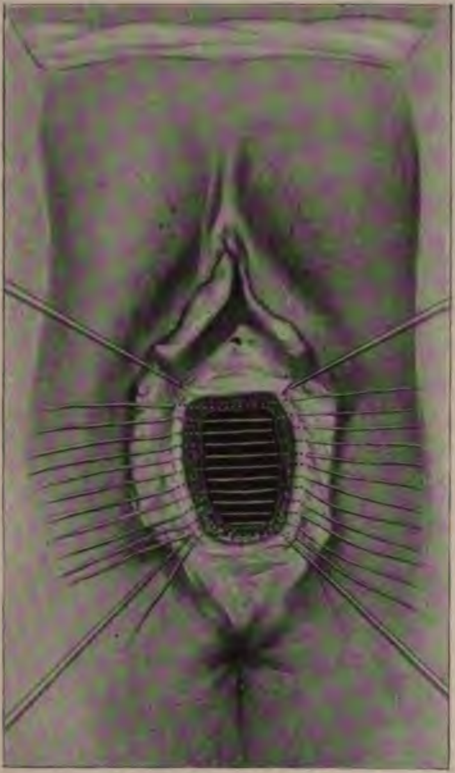

Fig. 183.—Colpocleisis.

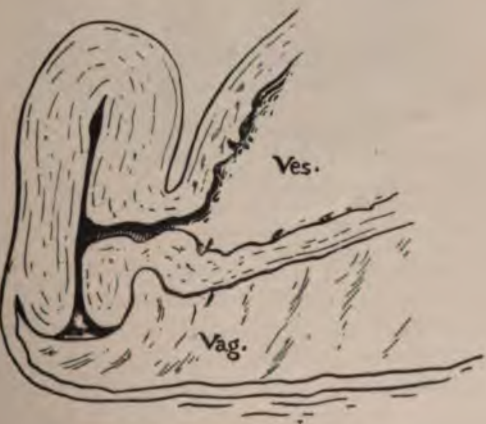

Fig. 184.—Vesico-uterine Fistula.

below upward and from above downward, exercising the greatest care that neither rectum, bladder, nor peritoneum shall be perforated by the sutures. The denuded surfaces should be brought in accurate apposition and the overlapping of freshened surface by mucous membrane or skin should be strictly avoided. This procedure, while it affords a means of relieving incontinence of urine in otherwise desperate cases, has many disadvantages. Impregnation is no longer possible; coition can be practised only when obliteration has occurred high in the vagina. The menstrual blood not infrequently excites violent cystitis, resulting in pyelonephrosis and the formation of vesical calculi. The urine may cause metritis or tubal, ovarian, and even peritoneal inflammation. Rectovaginal fistula has been made to supplement this operation when the neck of the bladder has

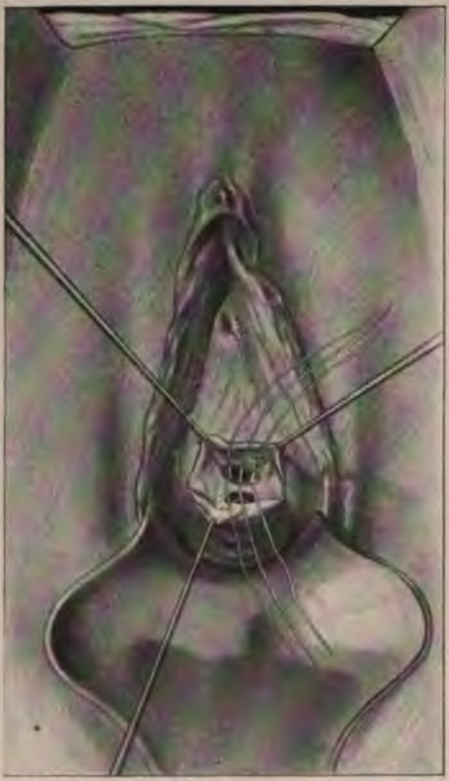

Fig. 185.—Closure of Fistula after Its Exposure by Incision through Anterior Vaginal Fornix.

undergone such injury as to render the patient unable to retain the urine. The majority of such cases have been unsuccessful, owing to the irritation of gas and feces and the inclination of the fistula to close.

269. **Urethrovaginal fistula** is much less frequent. It is characterized by the discharge of urine into the vagina during micturition. The flap-splitting operation is the most satisfactory.

270. **Vesico-uterine fistula** permits the escape of urine through the external os. It may result from a slough following a tedious labor, and from lacerations of the cervix when the tear is extensive through the anterior lip. The tear may have been incomplete, not extending through the os, or such a fissure may heal with the exception of the communication between the bladder and cervix. The only condition with which such a fistula can be confused is the uretero-uterine. The latter fistula is rare. Upon injection of the bladder with a colored fluid (a solution of pyoktanin) its emergence from the os demonstrates the presence of a vesical fistula; the continuance of clear fluid, a ureteral. In an opening of considerable size the sound will pass directly into the bladder, where it may be recognized by another inserted through the urethra.

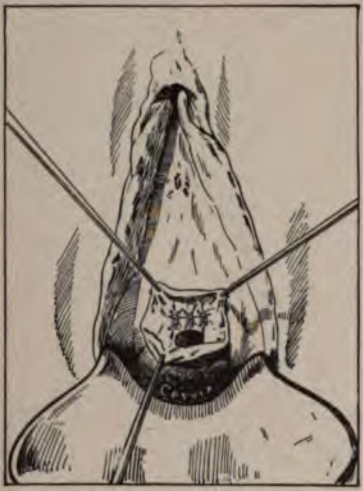

Fig. 186.—Fistula Closed into Vagina. Uterine Opening Remains, Which Will Close of Itself.

Treatment.—The fistula may be exposed by dilating the cervix with a laminaria tent. In a uretero-uterine fistula this procedure would be accompanied by renal pain, nausea, and vomiting, due to the obstruction of urine from the kidney corresponding to the affected ureter. The fistula may be denuded and closed from the cervical canal, but the operation is attended with difficulty. The preferable procedure is to cut through the anterior fornix of the vagina and dissect the bladder from the cervix, when the opening may be exposed and sutured; the vaginal wound is subsequently closed with silk or catgut. It is desirable that the peritoneum should not be opened, though its incision, with proper precautions, does not materially affect the result. When the bladder-wall is thin, Herr advises cutting through the cervix and reinforcing the bladder-wall with cervical tissue. Sanger split the cervix in a case in which the sinus opened laterally,

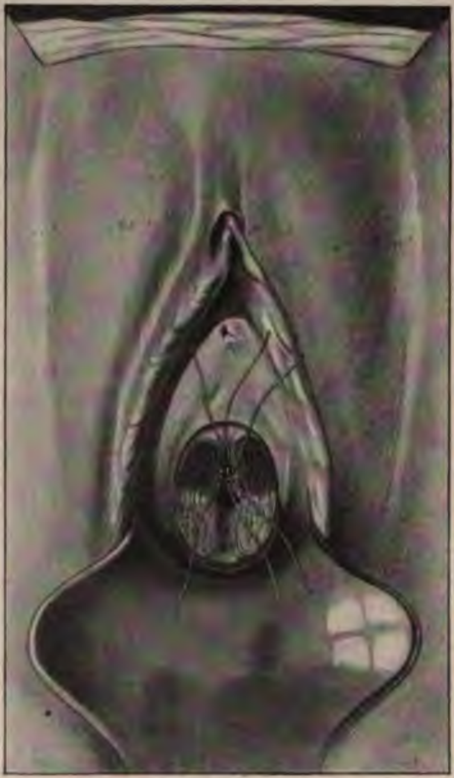

Fig. 187.—Closure of Fistula within Cervical Canal after Splitting Cervix.

sutured the side on which the fistula occurred, as in an Emmet operation, and then sutured the other side.

271. **Hysterostenosis or hysterocleisis,** the denudation and suturing of the cervix, is possible, but the menstrual flow may produce serious cystitis, and contraction of the fistula may result in severe pain and distress during menstruation.

272. **Vesico-uterovaginal (Cervical) Fistula.**—A portion of the cervix, with a considerable portion of the vaginal septum, may be destroyed, and the remaining walls may be so thin as to render its closure difficult or dangerous, owing to proximity of the peritoneum. In such cases the anterior lap of the cervix may be denuded and turned into the bladder, using it as a plug to fill up the opening.

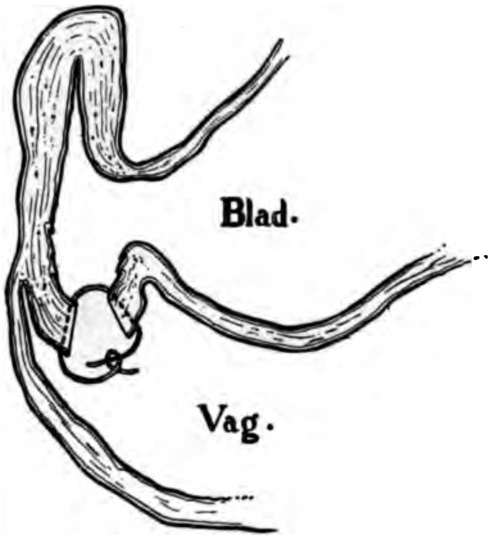

Fig. 188.—Section Showing Suture for Hysterocleisis.

When the fistula has occurred at the expense of the anterior cervical lip to such an extent that it will not afford sufficient structure to close the opening, the posterior lip may be freshened and utilized. This procedure necessarily produces disturbance, because of the continuance of menstruation. A preferable method is to separate the vesical wall from the vaginal and secure sliding flaps, which can be closed as in figure 191.

273. **Ureterovaginal-ureterocervical Fistulæ.**—Lesions of the ureter are less frequent than the other forms of fistulæ. Association of the ureter in the vesicovaginal opening is much

more frequent. The *diagnosis* has been considered. (See Section 252.) The cervical fistula is very rare. The thickened ureter can generally be traced to the cervix by the finger in the vagina.

Treatment.—Relief from the discomfort produced by these fistulæ may be accomplished by resort to one of three methods, viz.:

1. Anastomosis through the vagina.
2. Anastomosis through the abdomen.
3. Nephrectomy.

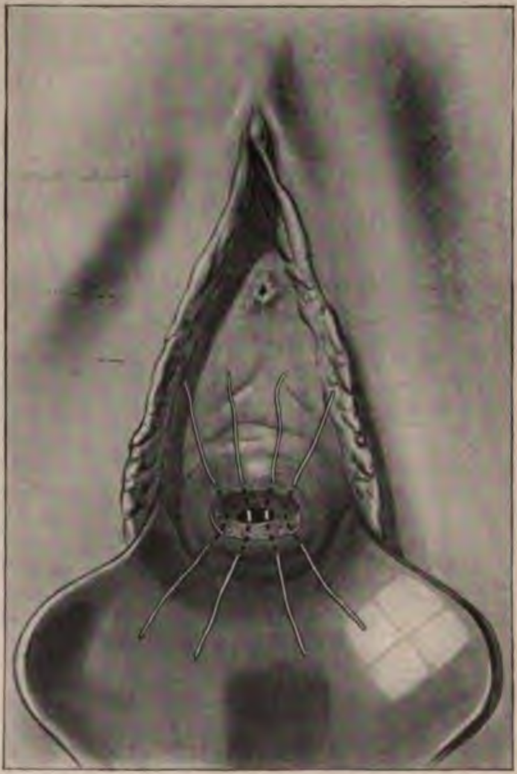

Fig. 189.—Hysterocleisis.

Anastomosis through the vagina is accomplished by first establishing an artificial vesicovaginal fistula alongside the ureter. This opening, and the ureter opened for the distance of nearly two centimeters of its intraparietal border, are prevented from closing by the subsequent daily use of the sound. After permanent cicatrization the vesicovaginal fistula, which now includes the ureteral, is closed by denudation and sutures (Simon). The vesicovaginal fistula may be formed by an oval excision. A small elastic catheter can be passed through the urethra into the bladder, into the orifice of the ureter, and through the fistula and vagina. With the patient in the genupectoral position the

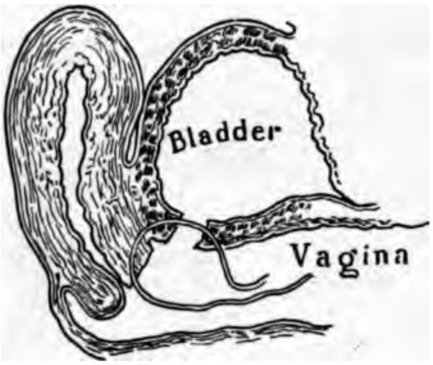

Fig. 190.—Anterior Lip of Cervix Utilized to Close the Fistula.

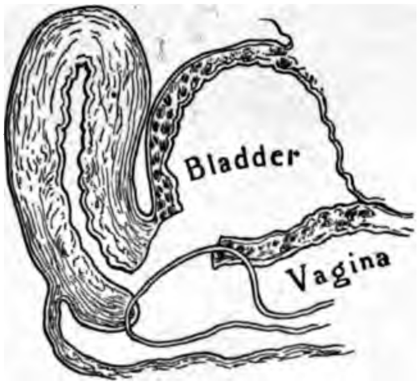

Fig. 191.—Vesico-uterovaginal Fistula in which the Posterior Lip of the Uterus is Utilized to Close the Opening.

vaginal mucous membrane is denuded around the fistula. To close the opening, the sutures are placed parallel to the catheter, which is left in place for several days (Landau); or a buttonhole incision may be made, removing two centimeters of the vesical mucous membrane in the direction of the ureter, the vesical and vaginal mucous membranes are sutured to prevent closure, and a catheter is introduced into the bladder through the urethra and into the orifice of the ureter through the vesical fistula. An annular denudation is made about the fistula, leaving immediately about it a zone of mucous membrane three millimeters in diameter. After suturing, the fistula with intact mucous membrane is turned into the bladder, where it forms a gutter-like depression, into which the ureter opens (Schede).

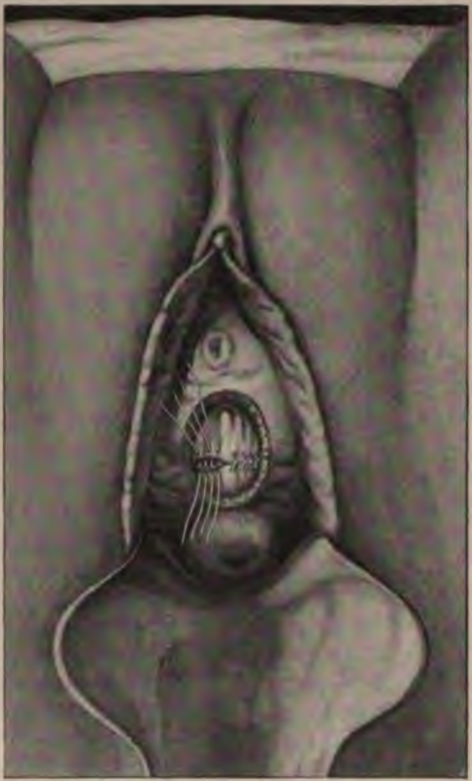

Fig. 192.—Vesical Wall Loosened and Sutured, Closing the Fistula.

All these methods employ the formation of an artificial vesicovaginal fistula, which must ultimately contract. As the ureter is a distinct canal, capable of being dissected out of its bed, there seems no reason why it should not be loosened from cicatricial adhesions, drawn down, and introduced through an opening in the vesicovaginal septum. This procedure is applicable to either vaginal or cervical fistulæ of this canal. In order to prevent compression of the ureter a portion of the bladder-wall should be excised. The ureter is introduced into the bladder, the vesical mucous membrane is stitched to the ureter by two or three sutures, and the wound is closed with sutures introduced into the wall of the ureter. Care should be exercised that the ureter is not compressed, nor much, if any, of its surface left uncovered in the vagina. In ureterocervical fistulæ the cervix should be split until the orifice of the ureter is exposed, when the canal can be drawn down and union accomplished in the manner just described. Obliteration of the vaginal orifice has been done after the establishment of a vesicovaginal fistula, but such a course is both unnecessary and undesirable.

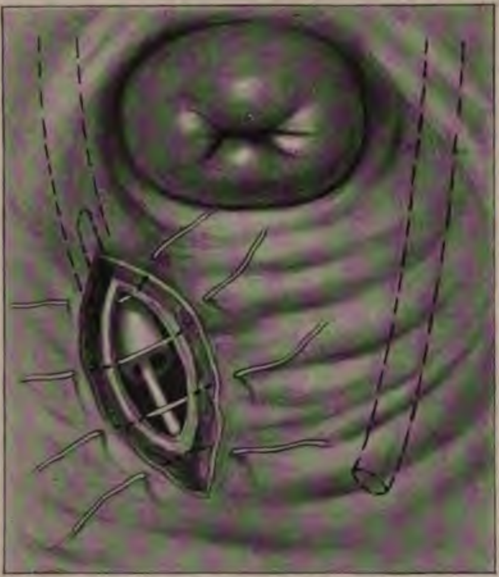

Fig. 193.—Operation for Ureterovaginal Fistula. Landau's Operation.

Anastomosis through the abdomen may be preferable in narrowed cicatricial vagina, or when the lower extremity has undergone inflammatory changes or is so embedded in exudation that it can not be readily brought down. Through the ordinary incision for abdominal section the intestines are drawn aside, exposing the line of the ureter. In ureterovaginal fistula its situation can the more readily be recognized by the introduction of a catheter prior to the abdominal incision. The peritoneum is opened, the ureter is raised, its proximal portion is tied and dropped back, and the central end is introduced through an incision into the bladder and secured by sutures, as in the vaginal method. The anastomosis with the bladder should be on the corresponding side of the pelvis, and with as little tension upon the canal as possible. Should the ureter be so short as to cause tension in reaching the bladder, the latter should be drawn up and

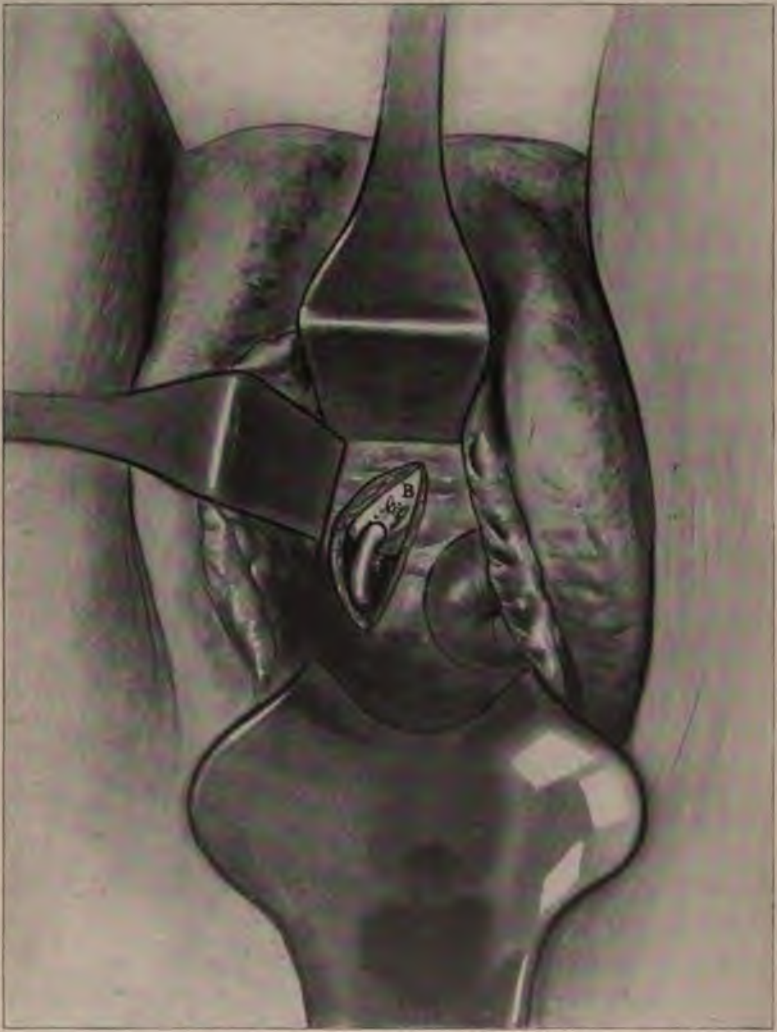

Fig. 194.—Vaginal Implantation of the Ureter into the Bladder.

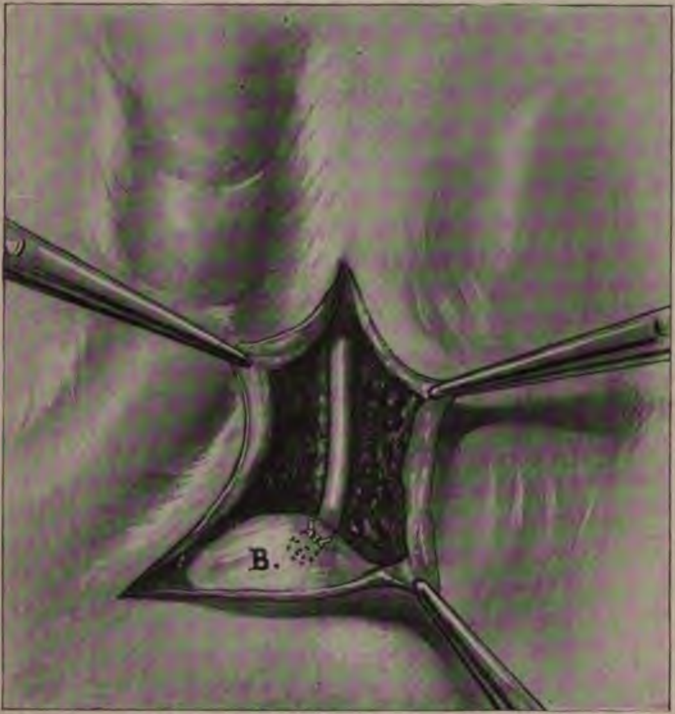

Fig. 195.—Abdominal Transplantation of Ureter for Ureterovaginal Fistula.

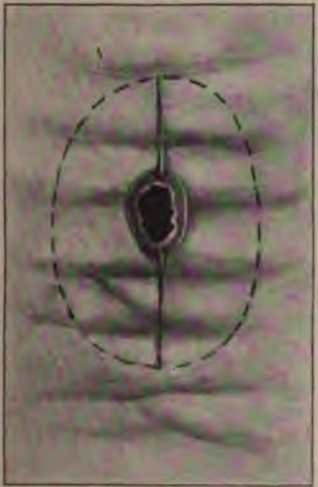

Fig. 196.—Sagittal Incision for Rectovaginal Fistula.

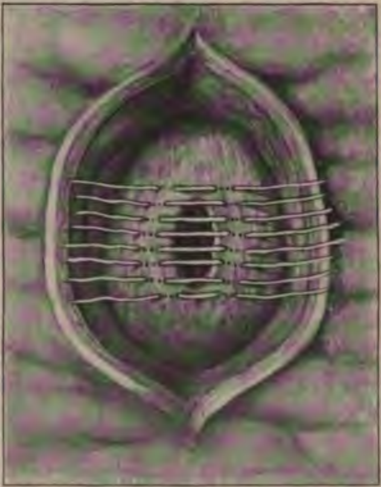

Fig. 197.—Lauenstein Suture in Rectovaginal Fistula through Rectal Wall

anchored by a few stitches to the side of the pelvis, so that no traction shall be made upon the ureter.

Nephrectomy is advisable when the long duration of the fistula has resulted in extension of infection to the pelvis of the kidney, and careful examination has disclosed that the other kidney is capable of carrying on the work of both organs.

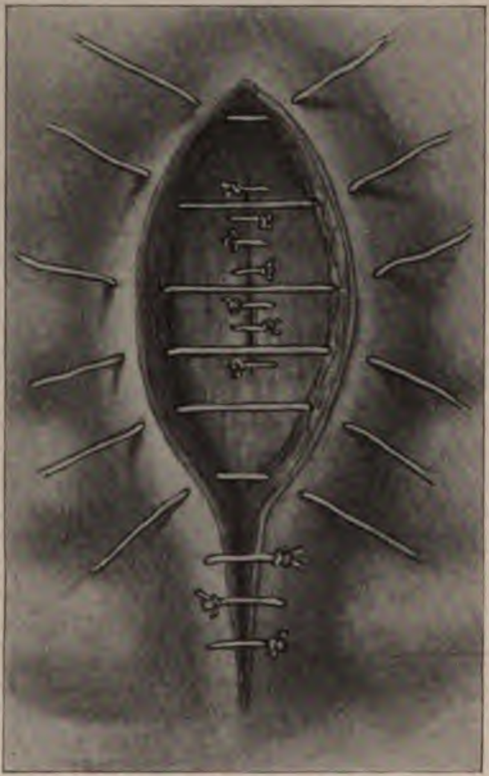

Fig. 198.—Rectal Wall Closed, Sutures Introduced to Close Vaginal Wound.

274. Accidents of the Operation and Results.—*Primary hemorrhage* of a serious character may result from an unusually large uterine artery, from vascular walls, or from injury of the vesical mucous membrane. Either compression or suture is the best means for its control, but its occurrence imperils the result of the operation.

Secondary hemorrhage may take place between the third and fifth days, and should be controlled by the tampon. It may occur into the bladder, and may be discovered only after that organ is filled with clot. It gives rise to violent tenesmus, and its decomposition will be extremely prejudicial to the success of the operation. When it can not be removed by irrigation, inject a solution of pepsin. If this procedure fails to afford relief, the urethra should be dilated and the clot broken up and removed with a blunt curet. If hemorrhage continue, it will be necessary to remove the sutures and search for the bleeding vessel.

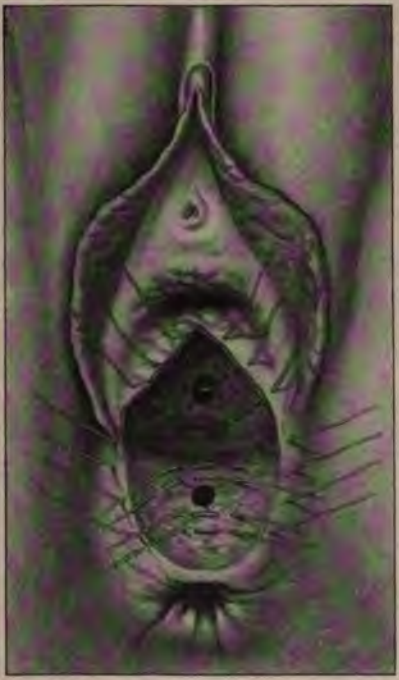

Fig. 199.—Rectovaginal Fistula Closed in Operation of Perineorrhaphy.

Inclusion of a ureter will cause nausea, vomiting, lumbar pains, and fever. The suspected suture should be immediately removed.

Peritonitis can result from injury during the denudation or suturing, or from infection, when proper precautions have not been observed, or when there is coexisting pyelitis or cystitis.

Calculi and calcareous concretions have formed upon silver wire, silk, or even catgut sutures.

The results of the operation are generally most satisfactory. Death is of very infrequent occurrence.

275. Rectovaginal Fistula.—The methods of treatment suggested (Section 262) are equally applicable to the fecal fistulæ. The last two methods, flap-splitting and flap-formation, are probably effective and most generally applicable in the great majority.

In a small fistula a curvilinear or triangular trap-door may be raised, including the fistulous orifice; the opening in the rectal wall is closed by very fine (eye) silk, which has been sterilized, or by chromicized catgut; one or several Lauenstein sutures may be used, being careful not to enter the rectum. The vaginal flap is then secured with silkworm-gut sutures. In large fistulæ a sagittal incision with lateral flaps is most satisfactory. The sutures are introduced as previously described. Flap-formation is very serviceable in closing rectal fistulæ of considerable size; flap-transplantation is rarely successful.

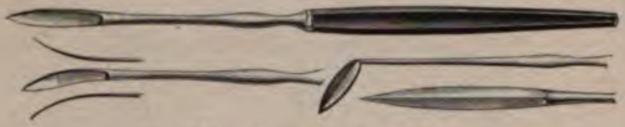

Fig. 200.—Knives for Denudation.

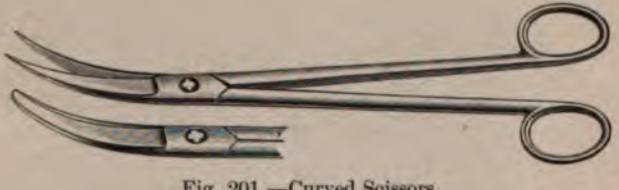

Fig. 201.—Curved Scissors.

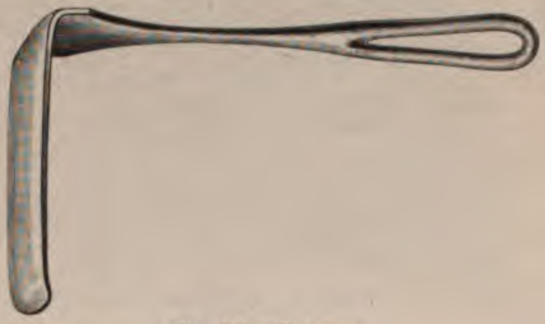

Fig. 202.—Retractor.

276. An anovulvar fistula can be closed from the vagina or perineum. Such a fistula is incised through its track, cureted, and the entire sinus closed by sutures. It is generally better to extend the incision to, but not through, the sphincter, and to close the rectal or anal surface with sutures from the perineal side, when failure to unite will not endanger the future value of the sphincter and will enable the operator to secure union by granulation through gauze packing. Small fistulæ near the vulvar outlet can be closed as a part of the operation of perineorrhaphy.

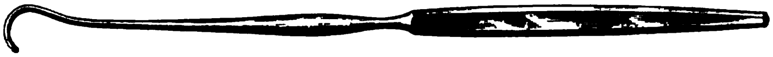

Fig. 203.—Blunt Hook.

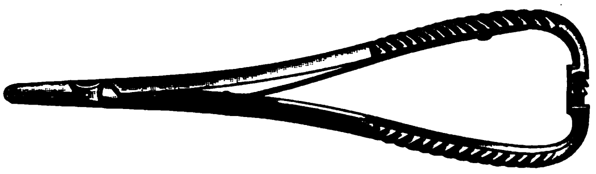

Fig. 204.—Needle-holder.

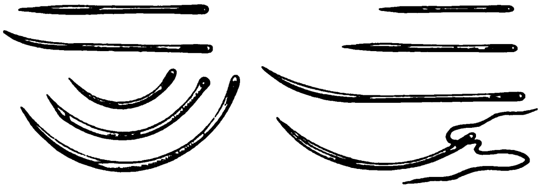

Fig. 205.—Needles.

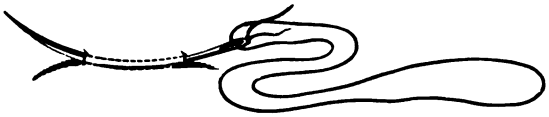

Fig. 206 —Needle with Loop for Suture.

277. Preliminary and After-treatment.—The bowels should be thoroughly evacuated by repeated purging for two or three days, and during the same period vaginal douches should be given, but a thorough scrubbing of the vagina with a solution of creolin and soap should immediately precede the operation. No operative procedure for closing a fistula, however, should be entered upon until careful rectal examination has demonstrated the absence of a possible rectal stricture as its cause. For several days prior to the operation, and for at least a week subsequently, the patient should be kept upon an animal broth diet, and the use of milk should be prohibited. The operation should be preceded a few hours by thorough irrigation of the rectum, and continuous irrigation should be practised during it. After the third day the bowels should be moved each alternate day. The sutures of silk should be removed upon the eighth day; silkworm-gut or silver wire may be permitted to remain for fifteen days. The patient should be confined to bed the greater part of three weeks, and the bowels should not be permitted to become constipated for a month.

278. **Enterovaginal fistulæ** have been cured by cauterization or by denudation and suture from the vagina, but closing the fistulous intestine through the open abdomen is preferable, and then the vaginal opening will need no further consideration.

279. **Lacerations of the Genital Canal.**—Injuries, tears, or lacerations of the genital canal affect the uterus (body or cervix), the vagina or vulvar outlet, and particularly the perineum. Such injuries are generally the result of labor, though they may occur to a minor degree during coition, during manual or operative procedure, or from accident.

280. **Injuries of the body of the uterus** occur during parturition, as rupture, which may involve the anterior or posterior wall, in a vertical or transverse direction, and may be slight or sufficiently large to permit the escape of the fetus and placenta. Following abortion, the softened wall is occasionally perforated by curet or placental forceps; with the latter, loops of intestine are often seized and drawn through the os. In inflamed or flexed uteri the walls are frequently perforated by sound or bougie. In removal of fibroid growths the weakened wall can be ruptured, when the tumor will project through it, or the fundus uteri can be inverted and may be incised during the removal of the growth.

Treatment.—For the proper procedure in rupture of the uterus during labor the student is referred to one of the text-books on obstetrics. Perforation of the uterus following an abortion in the effort to evacuate a decomposing placenta should demand careful subsequent observation. The retained products should be removed with the finger. The danger of perforation is so great in such cases that placental forceps should only be used with the finger as a guide. Evidence of perforation, as presented by bringing a coil of intestine to the os, should require careful replacement of the knuckle of intestine and the certain determination that it has been pushed entirely through the uterine wound, after which the latter should be packed with iodoform gauze. Any appearance of shock, disturbance of temperature, or continued and severe irritation of the stomach should be considered an urgent indication for abdominal section. Perforation of the uterine walls by sound or bougie, unless associated with infection, has but little significance. Care should be exercised, however, not to irrigate with irritating fluids, and drainage of the uterus should be secured by gauze. The perforation during removal of fibroid growths should be considered as demanding immediate suturing of the wound through an abdominal section.

281. Injuries of the cervix uteri are usually the result of labor, and are described under the term *laceration*. This lesion occurs with greater frequency than any other. It is exceedingly rare for a woman to undergo a first parturition without more or less fissuring of the cervix. The tear may vary from a slight fissure, which completely disappears during convalescence, to an extensive tear extending to or into the vaginal fornices.

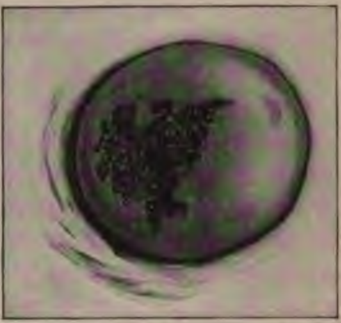

Fig. 207.—Slight Fissure of the Cervix.—(*Munde.*)

The lacerations are unilateral, bilateral, stellate, and through the anterior or posterior lip. The bilateral is the most frequent. The unilateral is more frequently found upon the left side, owing to the greater preponderance of the left occipito-anterior position. Lacerations can occur into the cellular tissue laterally, or into the bladder in front, and cause a vesico-uterine fistula. (See Section 270.) The cicatrization of a lateral tear may produce a band or bridle which tilts the fundus uteri to the opposite side.

282. Symptoms.—There are no special or specific indications of the existence of laceration. The symptoms are those of the complicating conditions. The lesion results in subinvolution and in consequent increased weight. The sensation of bearing down, discomfort in standing or walking, and pain in the sacrum and in the iliac regions are common. The lower level of the organ, with traction of the vaginal walls upon the lips, leads to separation of the latter, eversion of the mucous membrane, thickening of the cervical tissue from its exposure, and fixation of the everted lips. Irregular or excessive menstruation, or metrorrhagia, is not infrequent. Bleeding is excited by locomotion, coition, or sexual excitement. The endometritis leads to profuse leukorrhea, which constitutes a double drain. The cicatricial bands and the everted lips not only permit a depression of the uterus in the pelvis, but produce either lateral eversion or retroversion, according to the unilateral or bilateral character of the lesion. With cicatrization of the lacerated surfaces, not infrequently the scar tissue in the angles of laceration causes pressure upon the nerves, producing profound neurotic or reflex phenomena. Pressure with the finger against such a plug aggravates the reflex phenomena.

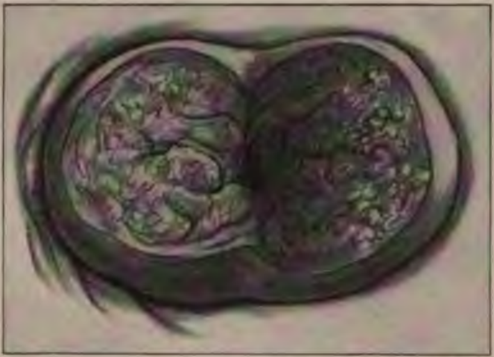
Fig. 208.—Extensive Laceration of the Cervix.—(*Munde.*)

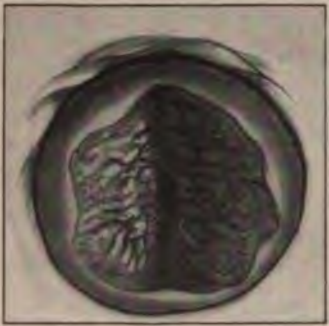
Fig. 209.—Bilateral Laceration of the Cervix.—(*Munde.*)

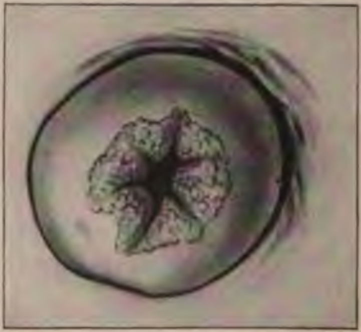
Fig. 210.—Slight Stellate Laceration of the Cervix.—(*Munde.*)

283. Diagnosis.—The existence of a laceration is readily determined by the finger, but its apparent presence must not be accepted as proof positive of previous pregnancy, for congenital fissure has been recognized, which permits the eversion of the lips as in a deep bilateral tear. The finger will also disclose the condition of the lesion, whether it is cicatrized, the eversion of its lips, the presence of erosion, when it has a soft, velvety feel, or the existence of eversion of the cervical mucous membrane. Inflammation and obstruction of the glands of Naboth will be disclosed by small, shot-like masses studding the cervix. Passing the finger upward, the lips will be found spread out, like the top of a celery stalk, hard, dense, and fixed.

The bivalve speculum, by drawing upon the anterior vaginal wall, aggravates the eversion. The tubular speculum flattens the surface, removes the trace of the fissure, and leads to such a condition being mistaken for granular erosion. The Sims or some retraction speculum affords the best exposure. Seizing each lip with a tenaculum discloses the extent of the tear. The surface of the tear is covered with exuberant granulations, which bleed upon the slightest touch, and the profuse discharge renders the determination from epithelioma sometimes exceedingly difficult. It can be recognized by the course of the disease under treatment.

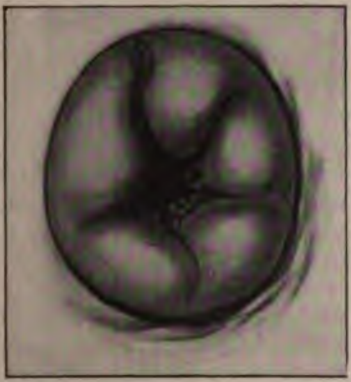

Fig. 211.—Extensive Stellate Laceration of Cervix.—(*Munde.*)

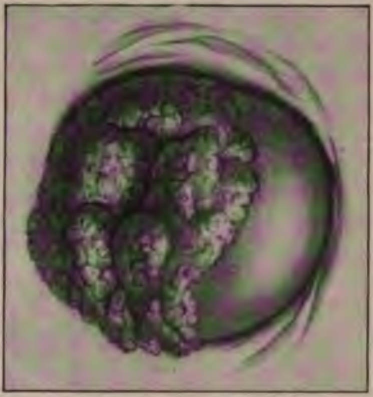

Fig. 212.—Laceration of the Cervix with Hypertrophy and Eversion of Cervical Mucous Membrane.—(*Munde.*)

284. Treatment.—Immediate examination after labor in order to determine the possibility of laceration is undesirable. While the cervix is thin, soft, and relaxed, yet the lesion can be recognized. The majority of small lacerations unite spontaneously under ordinary antiseptic precautions. The existence of severe arterial hemorrhage should be considered as demanding examination to ascertain its source; and when found, the lacerated surfaces should be sutured to control hemorrhage and to close the rent.

Not every laceration demands an operation, and if not primary, three months should pass before the repair is performed. Small fissures that are inclined to close or that have cicatrized should not be subjected to operation. If complicated with endometritis, the latter should be treated. Operation in slight cases is to be condemned, as it obstructs drainage and may cause the extension of disease to the tubes and pelvic peritoneum. An operation is indicated in deep laceration, in eversion with hypertrophy and cystic degeneration of the mucous membrane, in cicatricial formation at the angles of the fissure, with reflex phenomena, and in subinvolution and endometritis. In addition to slight lacerations, and those which have cicatrized, operation is contraindicated in tubal or peri-uterine disease. It should not be performed in severe endometritis until the patient has been relieved by local treatment.

285. Preliminary Treatment.—The presence of endometritis, of marked eversion, and of hypertrophy of the mucous membrane should indicate the employment of measures for their relief. The patient should have her diet regulated, constipation should be corrected, and the accompanying anemia should be improved by the use of tonics. A vaginal douche of hot water should be frequently employed. The cervix should be scarified or punctured, thus securing depletion. All obstructed Nabothian glands should be punctured and the surface painted with Churchill's tincture of iodin, a combination of tincture of iodin and creasote (2 : 1), silver nitrate (ʒj to f℥j), zinc chlorid (ʒj to f℥j), or pyroligneous acid. The superfluous material should be sponged away and a tampon of gauze and cotton applied beneath the uterus. By raising the organ to a higher level the sensation of weight or heaviness is removed and the circulation is improved.

The tampon may consist of plain sterilized gauze and cotton, medicated gauze (iodoform, carbolic or boric acid, or thymolized). Sublimated gauze should not be used, because it causes pruritis. The tampons may be medicated with preparations of glycerin,

℞. Pulv. alum., ... ℥j
Acid. carbolic., ... ℈iv
Glycerin., ... ʒxij

a fifty per cent. solution of boroglycerid, or a ten per cent. solution of ichthyol. In place of the glycerin the tampon can be medicated with an ointment, such as twenty-five per cent. of ichthyol in lanolin. The local treatment, followed by a tampon, may be applied twice a week, and the latter should be removed at the end of forty-eight hours, to be followed by a vaginal douche of half a gallon of hot water (temperature from 110° to 120° F.) twice daily. The douches are preferably given with a fountain (gravity) syringe, while the patient is in a recumbent position on a bed-pan. If the patient has a profuse discharge of glairy mucus from the cervix, a blunt curet should be employed to remove it. This procedure presses the mucous collections from the cervical glands and permits the application to come directly in contact with the diseased surface. The medicament may be applied by means of a cotton-wrapped probe, or may be carried into the canal with a pipet. (Fig. 84.) Intracervical applications should not be made, however, unless the cervical canal is quite patulous, so that the fluid or increased serous discharge can readily escape. If the canal is obstructed by hypertrophied and everted mucous membrane, gauze packing (Section 82) or the use of a laminaria tent (Section 77) will render the application more effective and safe. Irregular bleeding or profuse leukorrhea should be an indication for the use of the sharp curet (Section 83), after dilatation (Section 79). The uterus should be irrigated, during or following curetment, with a disinfectant solution—bichlorid (1 : 3000), formalin (1 : 1000), or a hot soda solution (ʒ iv to Oij)—and packed with iodoform gauze.

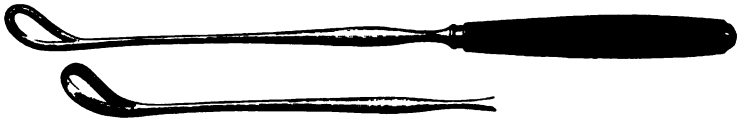

Fig. 213.—Blunt and Sharp Curets.

286. Trachelorrhaphy (*i. e.*, neck sewing), or hysterotrachelorrhaphy (*i. e.*, womb-neck sewing), is the operation devised by Emmet for the relief of laceration of the cervix. The patient, prepared (Section 119) and under anesthesia (Section 127), is placed upon a table in the lithotomy position, with a perineal pad beneath her to carry the irrigating fluid into a slop-jar at the end of the table. An assistant holds either leg, while the operator sits facing the vulva. The following instruments, sterilized (Section 111), are in a tray upon a table at the operator's right: a scalpel or bistoury; curved scissors; long, rat-toothed dissecting forceps; two double tenacula; a retraction speculum (Edebohls'); six pressure forceps; a needle-holder; four strong needles, curved and bayonet-pointed, each threaded with a loop of silk to serve as a suture carrier. A smaller tray will contain the suture material. My preference for sutures is well-sterilized silkworm-gut. (Section 113.) The nurse at the operator's left should have some sponges (absorbent cotton) in a basin of sublimate solution (1 : 2000). A fountain syringe, filled with hot normal salt solution or some disinfecting fluid, should be suspended, so that the field of operation can be subjected to constant irrigation. The final preparation of the patient (Section 119) is completed, the cervix is exposed with a speculum, and each lip is so seized with a double tenaculum as to turn in the everted edges when the lips are apposed. The assistant upon the operator's left holds the tenaculum in the anterior lip and controls the irrigation tube; the one upon the right attends to the necessary sponging. The posterior lip is held by the weight of the tenaculum. With the knife the operator cuts through the cicatricial angle, and with scalpel and forceps denudes a corresponding surface upon each lip, in a bilateral laceration, first upon the left, then upon the right. The knife is preferred to the scissors, as the denudation can be made more evenly and with less bruising of tissue. The denudation is, of course, limited to one side in a unilateral tear. A strip of undenuded mucous membrane, one centimeter wide, should be left in each lip for the future cervical canal, and the precaution should be exercised not to encroach upon the vaginal surface of the cervix in the removal of the tissue. In deep lacerations the circular artery may be opened in the procedure. It should be seized with pressure forceps, and the first suture should be so introduced as to control it.

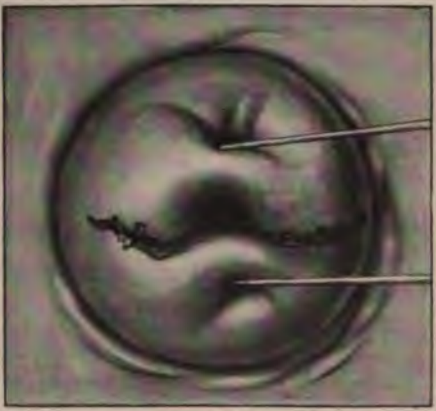

Fig. 214.—Edges of Laceration Turned by Tenaculum Hooked into Each Lip.

The sutures are placed by introducing the needle about three millimeters from the vaginal edge of the wound, bringing it out at its cervical margin, introducing it at a similar point in the other lip, and bringing it out in the vagina. Ordinarily, three sutures will be sufficient upon each side. Occasionally, the laceration will be so deep that the angle suture can not be properly placed by passing the needle as we have just described. It is then preferably introduced from within outward, which can be done by carrying the ends of the suture, by means of the carrier, through first the posterior and then the anterior lip, or with two needles threaded with carriers, each passed from within outward, the one anterior and the other posterior. One carrier is passed through the loop of the other and drawn out. The loop thus carried through serves to carry the suture. The sutures are tied, superficial sutures are introduced, if needed, and the vagina is thoroughly irrigated. If bleeding should continue, a suture should be introduced well above the denudation to secure the blood supply. Avoidance of subsequent hemorrhage is particularly desirable, if a plastic operation is also to be performed upon the vaginal outlet.

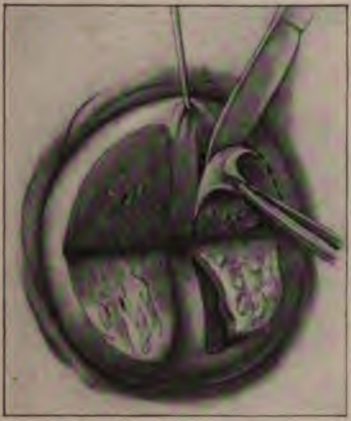

Fig. 215.—Denudation of Lacerated Cervix.

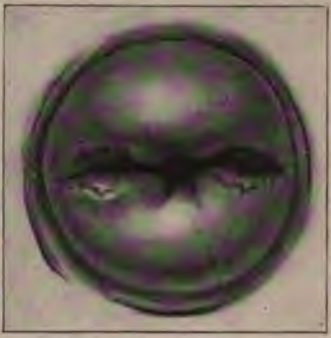

Fig. 216.—Surfaces Denuded Ready for Union.

287. **Amputation of the cervix** is to be preferred when the cervix is much elongated and hypertrophied, when the mucous membrane has become extensively hypertrophied and everted, and when cellular proliferation justifies the suspicion of incipient malignant degeneration.

The amputation can be by the double or single flap method for each lip. The instruments and preparations are similar to those given in the previous section. (Section 286.)

Double Flap Operation.—The lips of the cervix are seized and separated by double tenacula; an incision is made in each angle to the point at which it is desired to make the amputation. A wedge-shaped piece is removed from each lip, forming cervical and vaginal flaps. Two sutures are then introduced in each lip, uniting the cervical and vaginal mucous membranes. On each side a suture is passed in through the anterior vaginal and cervical flaps, out through the similar posterior flaps, and external to this such sutures as may be necessary to bring in apposition the raw surfaces. The sutures are tied and superficial sutures introduced, if necessary, to nicely adjust the surfaces. The more accurate the adjustment, the less will be the subsequent contraction.

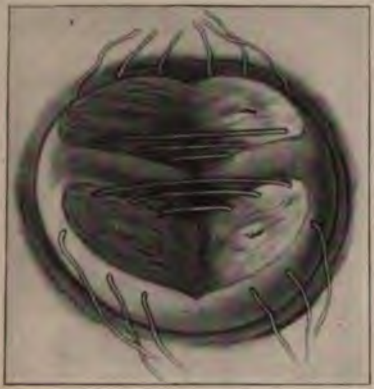
Fig. 217.—Sutures Introduced.

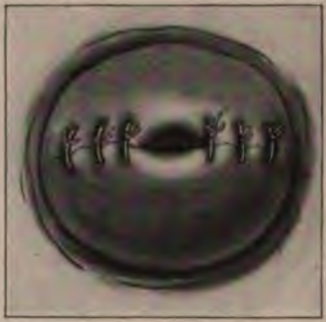
Fig. 218.—Sutures Tied.

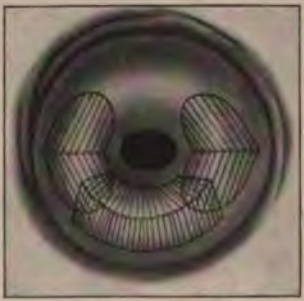
Fig. 219.—Double Flap Amputation of the Cervix.—(*Auvard.*)

Single Flap Method.—Schroeder's operation consists in making the denudation at the expense of the internal or cervical

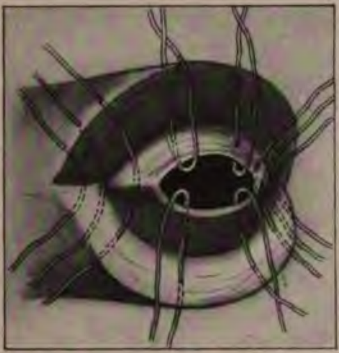

Fig. 220.—Sutures Introduced.—(*Auvard.*)

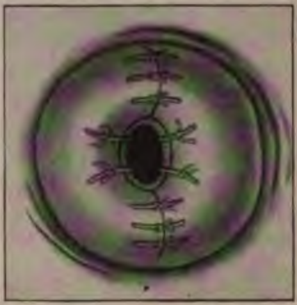

Fig. 221.—Wound Closed.

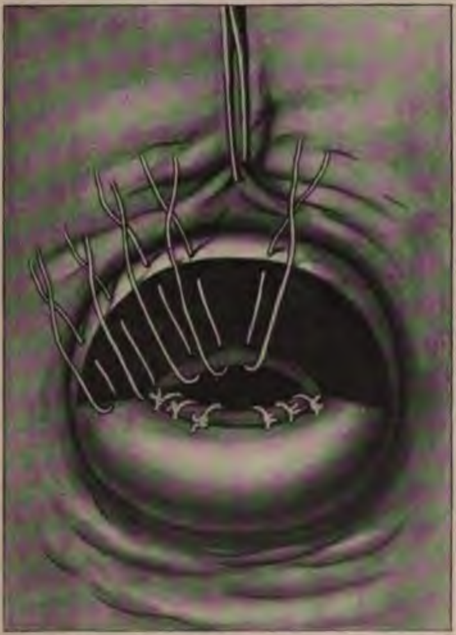

Fig. 222.—Schroeder's Single Flap Operation.

portion of each lip. This operation is preferable when the cervical mucous membrane is so diseased and hypertrophied as to render its retention for the formation of a flap undesirable. As in the former operation, the lateral incision is made and the lips are everted. Instead of a cervical flap, a transverse incision into the lip is made from within outward, at the level of the lateral incision, cutting half through the lip; then a vertical incision to the junction of the cervical and vaginal mucous membranes. A mattress suture unites the end of each flap to the corresponding cervical mucous membrane, and the remaining raw surfaces are adjusted by lateral sutures.

288. After-treatment.—The subsequent care does not differ in the various operations upon the cervix. For ease in their subsequent removal, the ends of the sutures should be left long. They should be gathered up and pushed back with a pair of forceps. Unless the vaginal outlet is to be the seat of an operation, the vagina should be loosely packed with gauze. The patient should be kept in bed for two weeks, and then permitted gradually to resume her ordinary life. Any pain should be relieved by the application of an ice-bag over the abdomen. The patient should void her urine, and the catheter should be used only when it is impossible for her to accomplish it while in the recumbent posture. Secure an evacuation of the bowels at least each alternate day. Avoid vaginal douches for the first forty-eight hours, affording the plasma opportunity to glue the apposing surfaces; then use a douche of hot sublimate solution (1 : 3000) or formalin (1 : 1500) twice daily. Remove the sutures at the end of two weeks, unless a perineal operation has likewise been performed, when it is preferable to permit them to remain for from three weeks to a month.

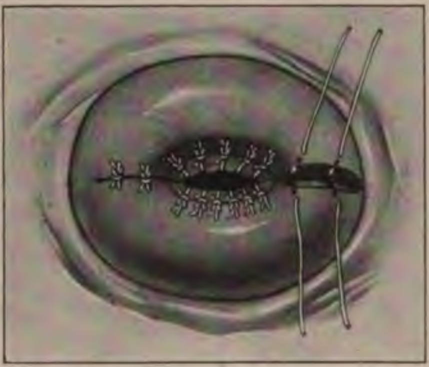

Fig. 223.—Schroeder's Operation Completed.

Direct the patient to avoid worry or much exercise during the following menstrual period, and not to resume the sexual relation for one month.

289. **Lacerations of the Vagina.**—Small tears of the anterior, posterior, or lateral wall of the vagina are not infrequent, and result in cicatrices which produce more or less disturbance of the pelvic functions. Separation of the muscular wall can occur without lesion of the mucous membrane. Not infrequently the entire vagina is crowded away from its muscular attachments, so that it subsequently appears as a relaxed sac, falling into folds which drag upon the cervix, displacing the uterus, or, when it is fixed, producing hypertrophic elongation of the cervix. The most frequent lesions are at the vaginal outlet, involving that portion of the pelvic floor known as the perineum. These lesions of the vagina are so intimately associated with, and dependent upon, the condition of the perineum that their treatment will be discussed with the lesions of the latter, under the head of injuries of the pelvic floor.

290. **Lacerations of the pelvic floor** are a frequent lesion of parturition, and can occur from within outward through the vagina and vaginal portion of the peritoneum, leaving its integumental covering intact. The injury is possibly a separation or a tearing-off of the muscular fibers from the sides of the vagina. Generally, the tear takes place through the integument of the perineum, and it may extend through the entire structure, the sphincter, and up the rectovaginal septum. Not infrequently it will be found that the injury has passed as deeply as, but to one side of, the rectum and anus, leaving both intact. Less frequently it will thus extend on both sides of the anus.

Naturally, the influence upon the subsequent appearance and function of the parts must vary with the extent and direction of the laceration. A slight laceration, involving only the anterior portion of the perineum, may heal without producing much, if any, deformity. A deeper laceration, by the action of the transversus perinei muscles, permits the vaginal orifice to stand open, and presents a triangular appearance. The failure of the bulbocavernosi muscles longer to antagonize the coccygeus permits the anus to be drawn back.

Laceration through the sphincter necessarily produces lack of control of the bowel-contents.

The deep laceration to one side of the anus leaves the levator ani unantagonized, and the parts are drawn to the opposite side; when the tear extends upon both sides, the anus is depressed and drawn backward. The vulva stands open, and we can look up the vagina from three to five centimeters.

291. Causes.—Injuries of the pelvic floor may arise, first, from conditions inherent in the mother; second, in the child; and third, in the course and management of the labor. Of the first class may be (*a*) too great or too slight an inclination of the pelvis, which renders the mechanism of the fetal head imperfect; (*b*) a small vulvar orifice with rigid muscles, or a large amount of fat in the perineum; (*c*) high or anterior situation of the vulva, making a long perineum, over which the child's head must be extended.

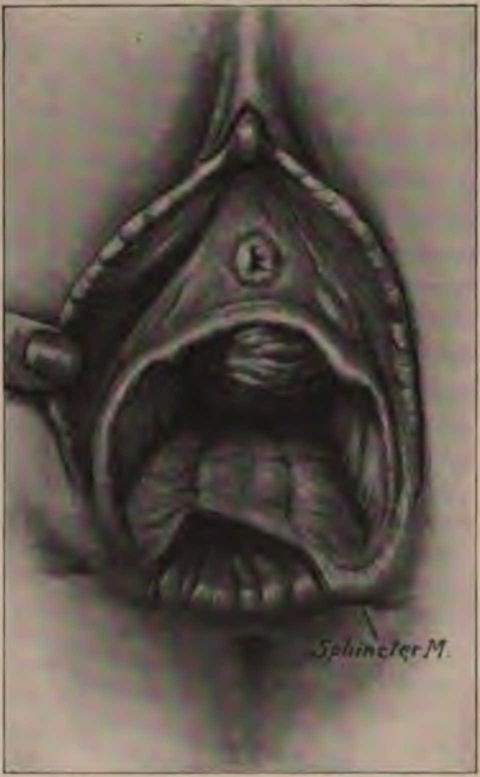

Fig. 224.—Rupture of Perineum into Rectovaginal Septum.

Second, laceration may result from excessive size of the fetal head and shoulders or from relative disproportion to the size of the mother.

Third, laceration may result from (*a*) either too rapid or too tedious labor; (*b*) vertex presentations when rotation occurs into the hollow of the sacrum and an occipitoposterior position presents a longer diameter of the head at the outlet; (*c*) face presentations, in which the longest diameter of the fetal head presents; (*d*) either incomplete or excessive flexion; (*e*) faulty manual or instrumental interference.

292. Degree or Extent.—Lacerations of the pelvic floor may be complete or incomplete, and are generally divided into four degrees: First, a tear through the fourchet and to a slight extent in the perineum; second, to the sphincter. These form the incomplete lacerations, while the complete are: third, the tear extending through the sphincter; and, fourth, up the rectovaginal septum. A rare form of laceration is the central rupture, in which the fetus passes through the perineum without tearing either the sphincter or the vulva.

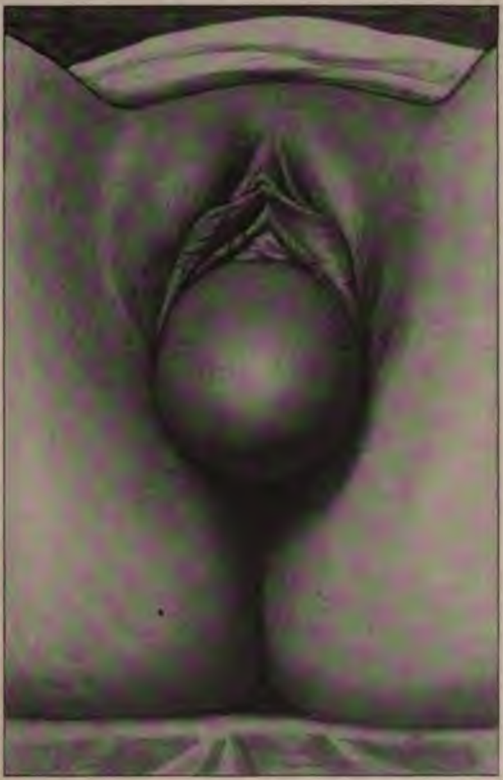

Fig. 225.—Cystocele.

293. **The results** of the injury are necessarily dependent upon its extent. The immediate effects are induced by the action of the injured or antagonistic muscles. The cicatricial tissue produces certain reflex nervous phenomena, which, however, are insignificant compared to the mental influence exerted by fecal incontinence. The laceration causes defective involution of vagina and uterus, the defect in the muscular junction of the pelvic floor weakens the action, and consequent resistance of the pelvic diaphragm. The constantly varying pressure of the bladder and rectum, the increased abdominal pressure consequent upon straining at stool, and the abnormally heavy uterus lead gradually to displacement downward of that organ, or, when it is fixed by the condition of its pelvic attachments, to extrusion of the anterior and posterior walls of the vagina, and their consequent weight

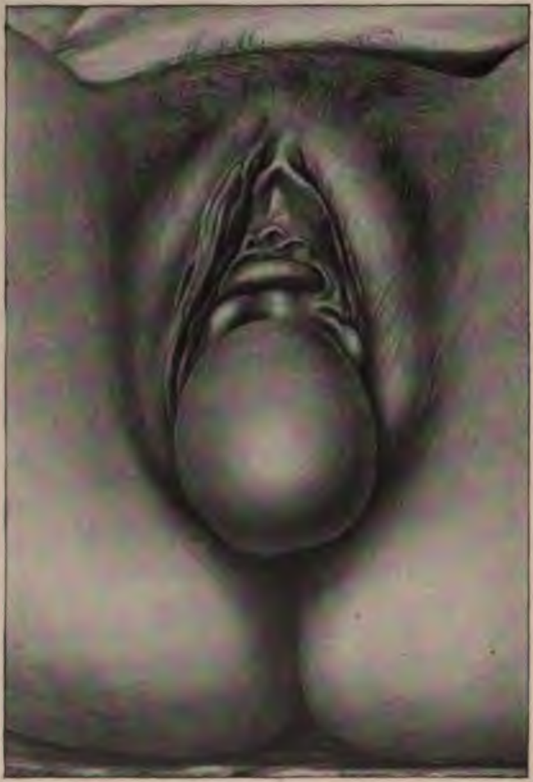
Fig. 226.—Rectocele.

can produce hypertrophic elongation of the cervix. Thus we have cystocele (prolapse of the anterior vaginal wall, and with it the bladder), rectocele (prolapsed posterior wall), partial or complete prolapse of the vagina, with elongation of the cervix, or procidentia, consequent upon the increased weight of subinvoluted organs and the diminished support resultant from the lesion under discussion.

294. **Treatment.**—The proper course of procedure is to repair the injury, restoring as nearly as possible the normal condition of the pelvic floor. In slight lacerations keeping the patient quiet and the parts clean will be sufficient to secure restoration. The operative treatment may be primary, intermediate, or secondary.

295. **By primary operation** is understood the immediate repair of the laceration, or at least within twelve hours. The tear presents a large, raw surface, and is frequently found with ragged, irregular edges. The vagina may have torn and the soft parts may have been pushed off until the perineum has split either through the sphincter or to one or both sides of the anus. The procedure will depend upon the nature and extent of the tear. The necessary instruments may be found in an ordinary pocket case—scissors, dissecting forceps, a needle-holder, and long and short curved needles. The suture material may be silkworm-gut, catgut, silk, or silver wire. The patient should be placed upon her back across the bed, or upon a table, with an assistant holding each leg, flexed upon the abdomen. As the parts are benumbed by the stretching to which they have been subjected, an anesthetic may be omitted; but when the patient is very nervous, should be administered. A rubber pad or a piece of mackintosh should be placed beneath the patient to prevent soiling of the bed and to direct the current of irrigating fluid into a receptacle upon the floor. Compress the uterus and cleanse it and the vagina of clots; cleanse the external surface with a disinfectant

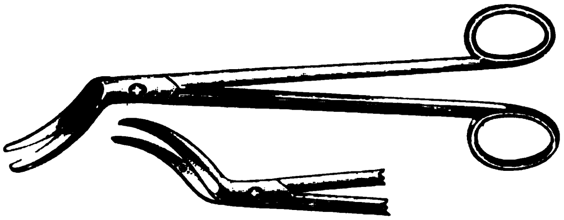

Fig. 227.—Right and Left Curved Scissors.

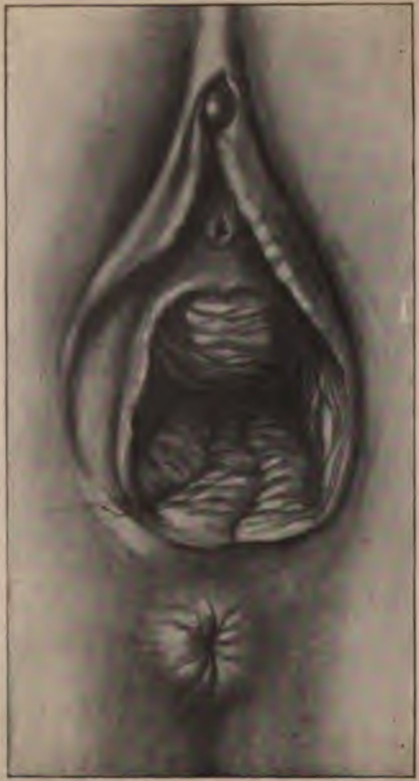

Fig. 228.—Incomplete Rupture of the Perineum.

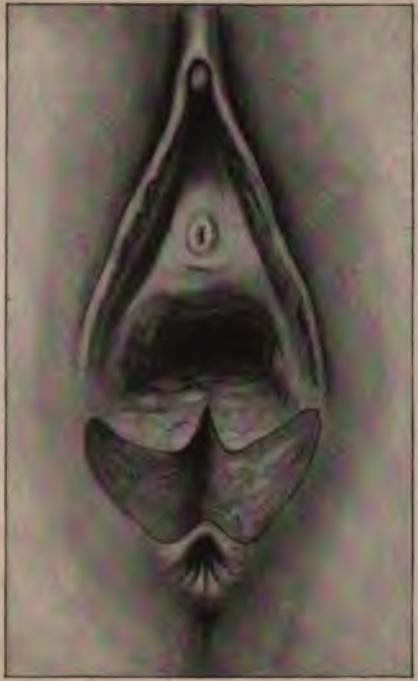

Fig. 229.—Simon-Hegar Method of Denudation.

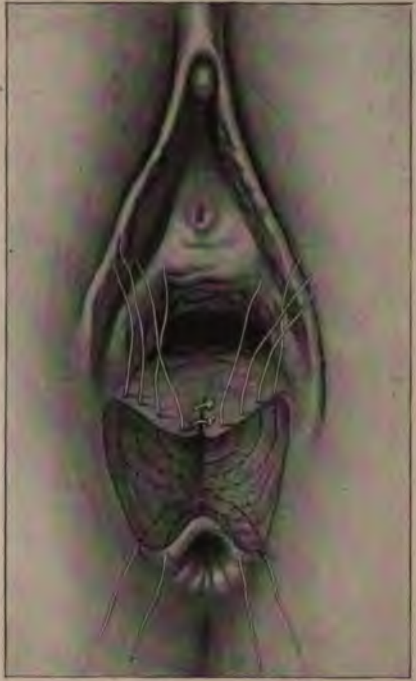

Fig. 230.—Sutures Introduced to Close the Wound.

fluid, after having trimmed the vulvar hair in order to keep it from embarrassing the procedure. Place a pad of gauze or absorbent cotton beneath the cervix to protect the vagina. Trim smooth the ragged edges of the tear and proceed to suture. Fine chromicized catgut is preferable, as it will not have to be removed, and as it produces less annoyance during the care of the patient than does either silkworm-gut or silver wire. In slight lacerations and vaginal tears the use of the continuous suture is satisfactory. In extensive laceration interrupted sutures offer advantages. Precautions should be exercised to leave no dead spaces in which blood may accumulate, become infected, and produce sepsis. In a double tear extending upon both sides of the rectum the needle should be entered from above, brought out in the sulcus, reentered, and carried upward through the vaginal mucous mem-

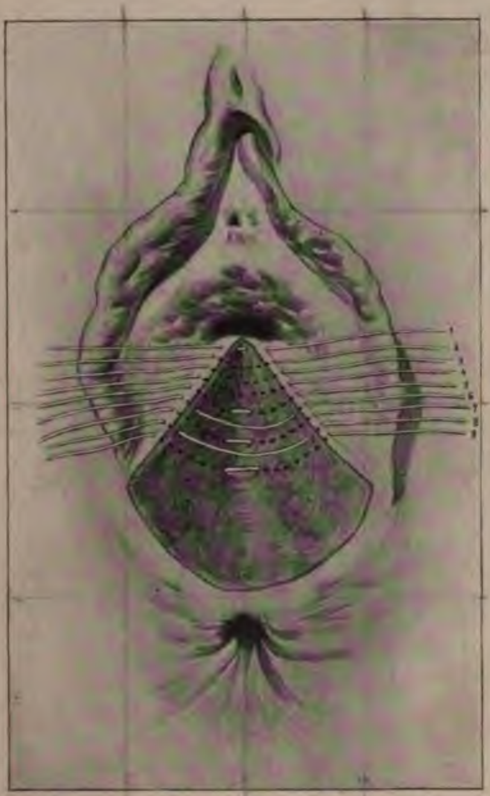

Fig. 231.—Garrigues' Modification of the Hegar Operation.

brane, so that each suture lifts up the tissue. Care should be exercised to restore the position of the levator ani muscles by bringing their torn ends back in position. So far as possible the sutures should be brought out in the vagina, as they thus produce less pain. The necessary perineal suturing may be with continuous suture, inclosing but little of the skin.

In laceration of the sphincter make sure that the ends of the divided muscle are secured and coapted by the suture. When the tear has extended into the rectovaginal septum, the sutures may be brought out and tied in the rectum, or, what is probably preferable, the Lauenstein suture may be employed, with buried catgut.

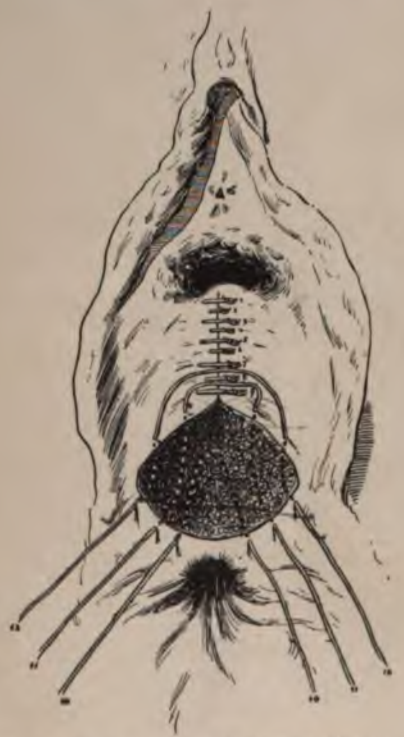
Fig. 232.—Upper Part of Wound Closed; Last Sutures Introduced.

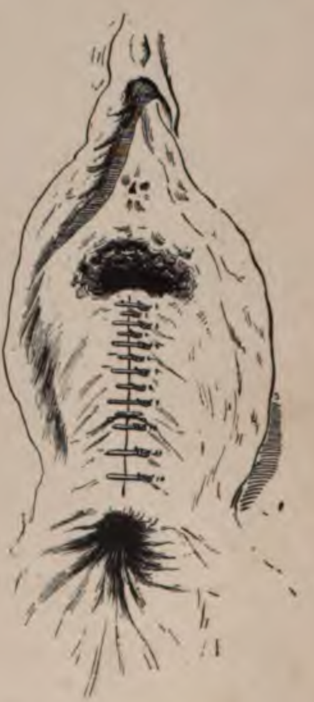
Fig. 233.—Wound Completely Closed.

296. The advantages of the primary procedure are: first, if the operation is successful, the patient is spared the necessity of a subsequent operation; second, with proper precautions she is much less likely to suffer from infection, and convalescence is expedited; third, the sequels of unrepaired injuries are avoided.

297. Contraindications.—The operation is contraindicated when the patient has been exposed to a prolonged labor and the tissues have undergone extensive fraying or bruising through prolonged manual or instrumental interference. It is also contraindicated when there is reason to believe that the wound has been exposed to some virulent infection. Even in such cases, with a tear through the sphincter, the patient should be subjected to a partial operation, in order to afford security to the contents of the bowel.

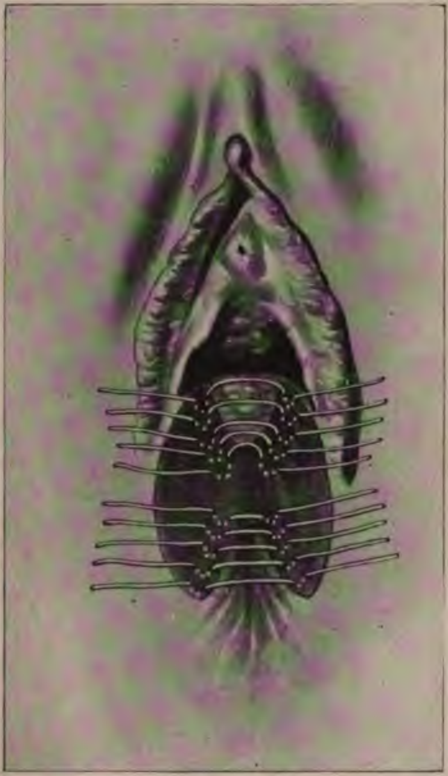

Fig. 234.—Lauenstein Suture.

298. The intermediate operation is performed any time from twelve hours to a week following the labor. The delay may be occasioned by want of proper material at hand, or it may be due to the condition of the patient, who is suffering from such profound shock that it will seem unwise to resort to any immediate procedure. With the delay, the surface becomes covered with plasma, and, later, granulations form, the surface is irritated by the lochia, and, unless strict antisepsis has been practised, it becomes an excellent culture field. Prepared as in the primary procedure (Section 295), the vagina is cleaned, gauze is applied to restrain the uterine discharge, the wounded surface is scraped with a curet or knife, the edges are trimmed, and the parts are sutured. The results are not usually very satisfactory.

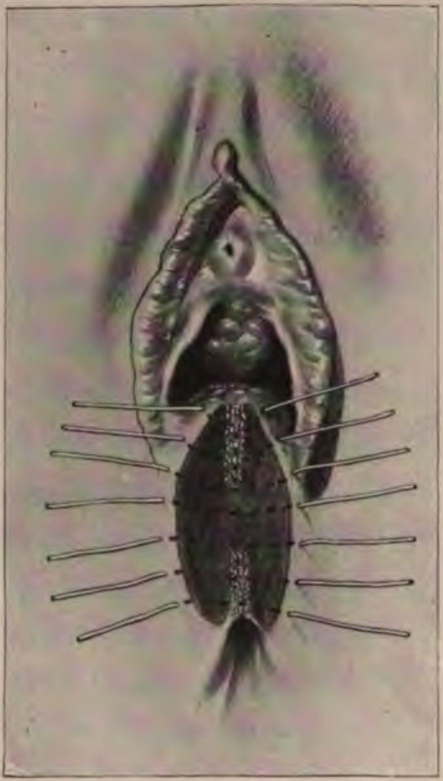

Fig. 235.—Rectum and Vagina Closed with Lauenstein Suture.

299. Secondary Operation.—This operation is not performed for at least two months subsequent to delivery, in order to permit involution and cicatrization to become accomplished. In preparation, particularly when the tear is complete, the bowels must

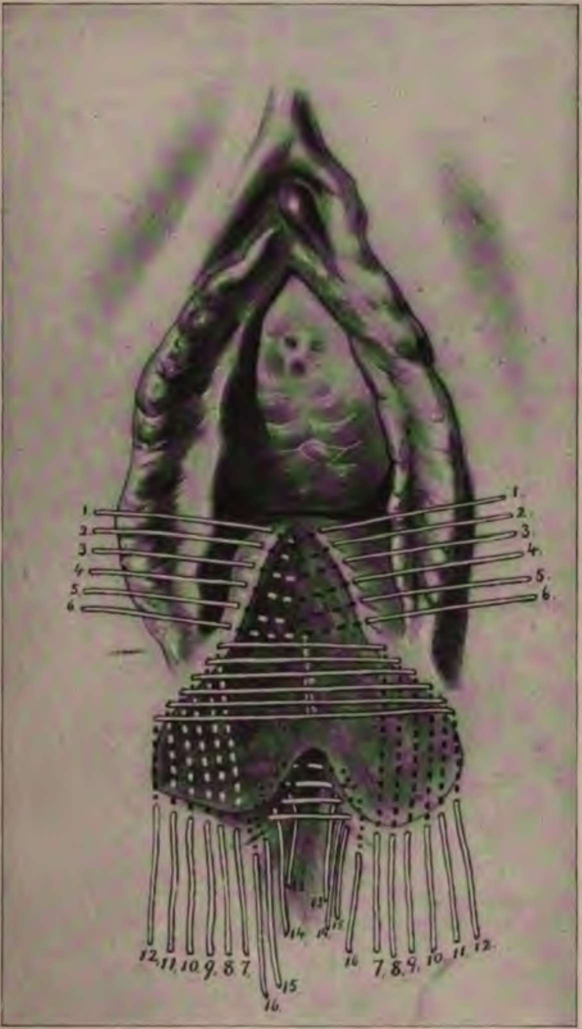

Fig. 236.—Hildebrandt's Method of Suturing.

be thoroughly evacuated. Castor oil, a saline, or compound licorice powder should be given several days or a week before the operation, and repeated at intervals of from twenty-four to forty-eight hours, thus insuring thorough evacuation of all hard scybalous masses. The diet should be largely of animal broth, absolutely excluding milk. The evening and morning before the operation, give a large enema to cleanse the lower bowel. Such an enema should be given at least three hours before the time of operation. Cleanse the patient (Section 119) and prepare the following instruments (Section 111): a scalpel; right and left curved scissors, as well as scissors curved on the flat; three double tenacula; eight pressure forceps; one long, rat-toothed dissecting forceps; a needle-holder; and two long and two short curved needles, all threaded with carriers. The suture material may be silk, silkworm-gut, catgut, or silver wire. In extensive laceration the silkworm-gut is preferable, for the reasons, first, that it, being more pliable, causes less pain during convalescence than wire, and, second, it is much less likely to become infected than either silk or catgut.

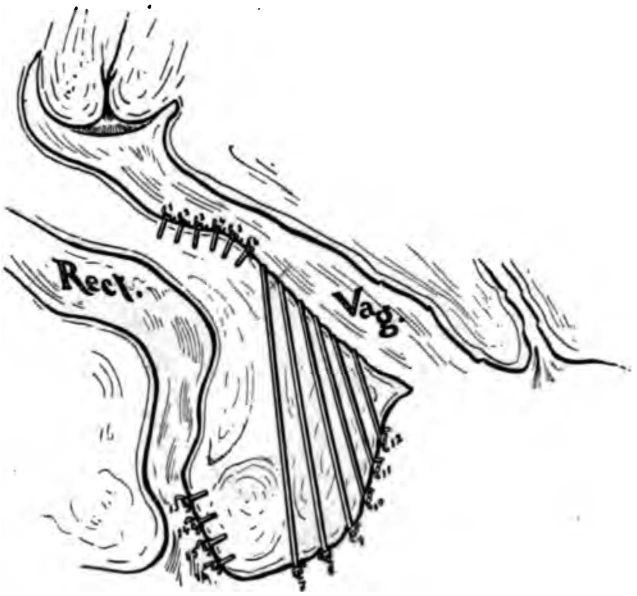

Fig. 237.—Hildebrandt Suture Closed.

Incomplete laceration may be repaired by a simple denudation of the torn surfaces. As cicatrization has resulted in contraction, it is necessary to extend the denudation of the vagina above the scar tissue. The further backward the rent extends, the higher into the vagina the denudation must be carried. The line of denudation extends posteriorly from the junction of the mucous membrane and skin at the top of the old posterior commissure across in front of the anus to a corresponding point upon the opposite side, while an angle extends up the vagina above the tear.

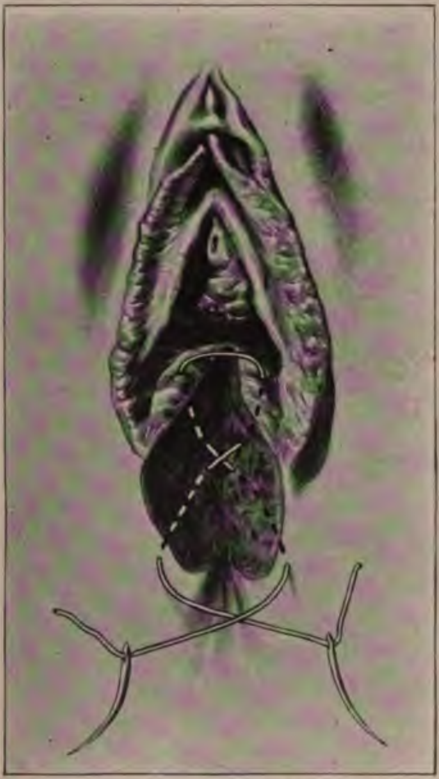

Fig. 238.—Heppner's Figure-of-8 Suture.

In Hegar's operation the sutures are introduced about three millimeters from the margin of the wound, buried beneath the denuded surface, and brought out at a corresponding point upon the opposite surface. The sutures in the vaginal angle are first secured, and then the perineal. The sutures tied produce less discomfort than those secured by compressing perforated shot upon their ends. The quill or bar suture was formerly much favored. It consisted of a quill placed in the loop of a double suture upon one side, the ends being tied over a second upon the opposite side, or the ends of a suture were passed through openings in a bar and secured by shot. The two quills or bars served for all the sutures, while the skin edges were united by superficial sutures. The suture caused so much pain that it has been largely discontinued.

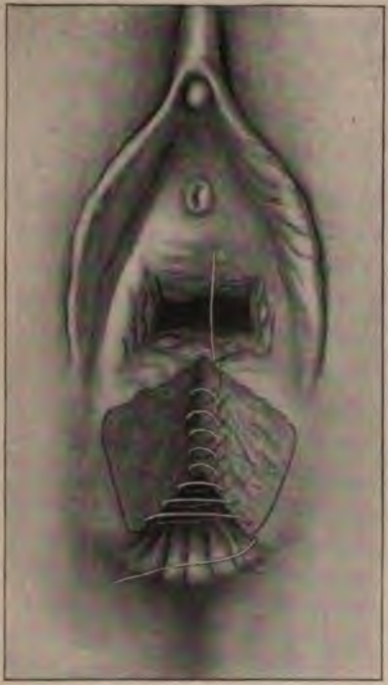

Fig. 239.—Martin Suture to Close the Rectal Opening.

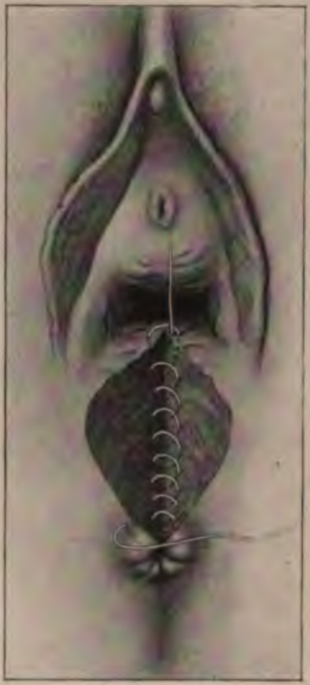

Fig. 240.—Martin Suture Continued.

A slight exaggeration of the denudation just described can be applied to the restoration of a complete laceration. The sutures must then be vaginal, rectal, and perineal. The latter are introduced after the former are placed. The rectal sutures of catgut are brought out into that canal. Care must be exercised in the introduction of the first perineal suture that it shall accurately bring the ends of the sphincter ani in apposition.

Garrigues performs a modified Hegar operation by the following procedure: According to the extent of the laceration and relaxation of the vagina and perineum, the vagina is seized with double tenaculum at a point in the median line more or less removed from the cervix. A point upon each labium majus is secured at such a distance from the clitoris as to permit of coition. The parts are rendered tense, the points are connected by an incision, and the intervening triangular surface is denuded. This denudation is carried downward to the margin of the skin and mucous membrane. With the vulva separated, the denudation presents a triangular surface.

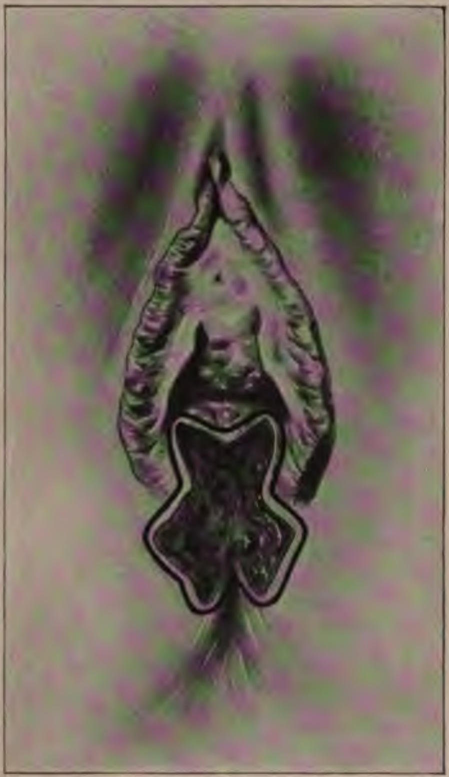

Fig. 241.—Denudation for Freund's Operation.

The sutures are introduced from above downward, about six millimeters apart, deep and superficial alternating, the latter passing only through the edges of the mucous membrane. The four upper sutures are transverse ; the remainder dip downward at the central portion, and, when tied, lift up the relaxed wall. The sutures are thus introduced and tied one after another until the remaining denuded surface forms an ellipse, the upper and lower

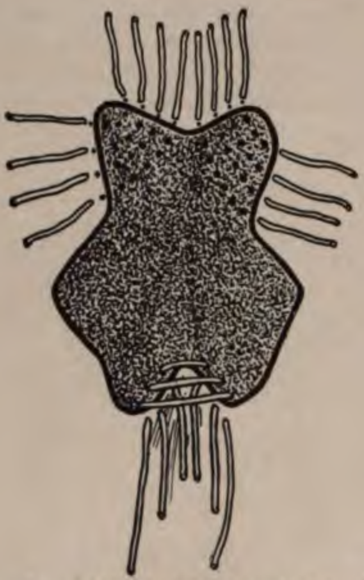

Fig. 242.—Sutures Inserted in Rectal Wall and Lateral Vaginal Angles.

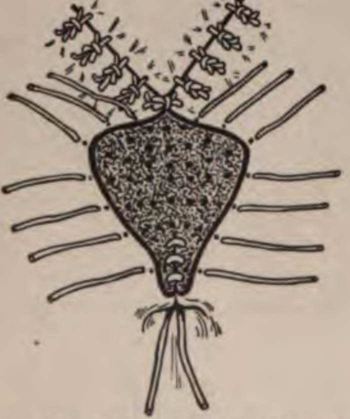

Fig. 243.—Vaginal Angles and Rectal Wall Closed. Suture in Place for Perineum.

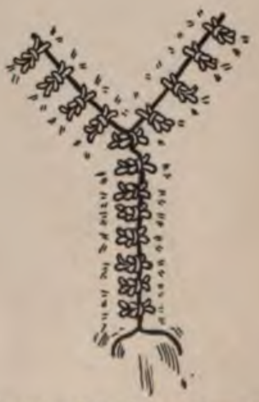

Fig. 244.—Denudation Completely Closed.

borders of which are of equal length. Then a silkworm-gut suture (10) one centimeter above the posterior commissure is carried deeply beneath the wound two-thirds the width of the denudation, and emerges at a similar point upon the opposite side. A second suture (11) is inserted midway between this suture and the outer margin, passing beneath the denuded surface, emerges upon the vagina to the left of the median line, is reintroduced, and comes out equally distant from the first suture upon the right side. The last suture is introduced near the extremity of the denuded surface, appears in the vagina midway between the second suture and the external denuded angle, reenters upon the opposite side, and emerges upon the right labium. These three sutures are all introduced and the surface is irrigated, when they are secured.

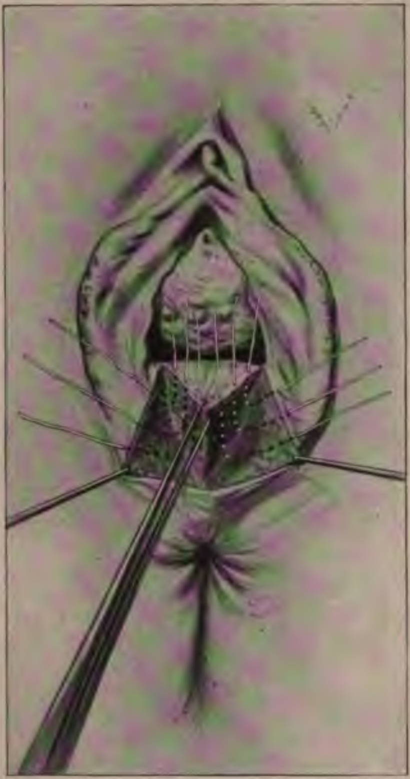

Fig. 245.—Emmet's Operation. Surface Denuded and Lateral Sutures in Place.

Lauenstein's Method of Suturing.—This method of introducing the sutures was devised to prevent their infection by the rectal and vaginal discharges. The sutures, of catgut or fine silk, are introduced in the bleeding surfaces, including about five millimeters of the tissue intervening between the borders of the rectal and vaginal mucous membranes respectively. These are necessarily buried sutures. The remaining portion of the denuded surface is closed by silver wire from the perineum.

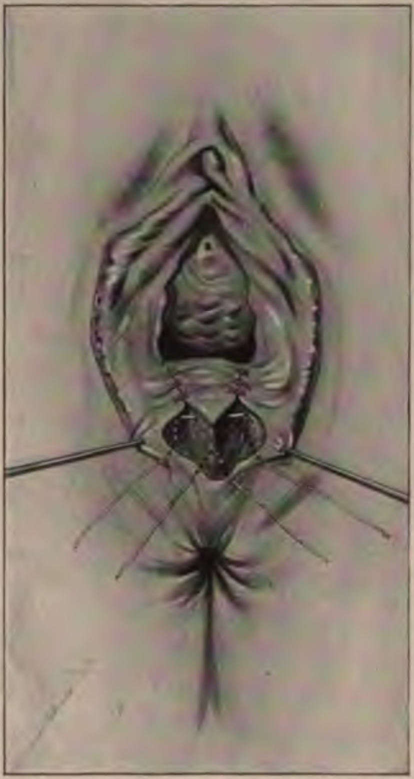

Fig. 246.—Emmet's Operation. Lateral Angles Closed and Perineal Suture Introduced.

Hildebrandt makes the denudation trefoil in shape. The sutures are for the most part cutaneous. The vaginal sutures are first introduced; next the rectal, and, finally, the perineal. This method of suturing obliterates dead space and decreases the danger of abscess.

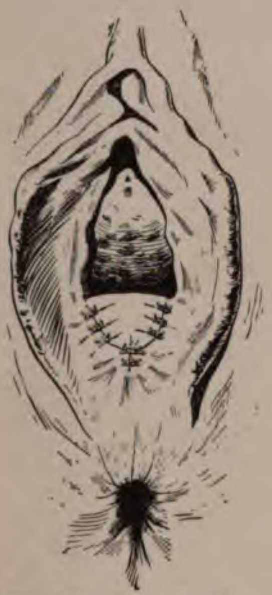

Fig. 247.—Emmet's Operation Completed.

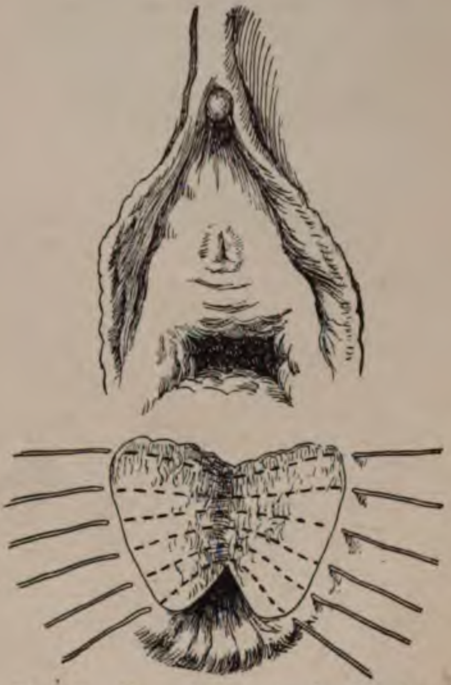

Fig. 248.—Emmet's Operation for Complete Laceration.

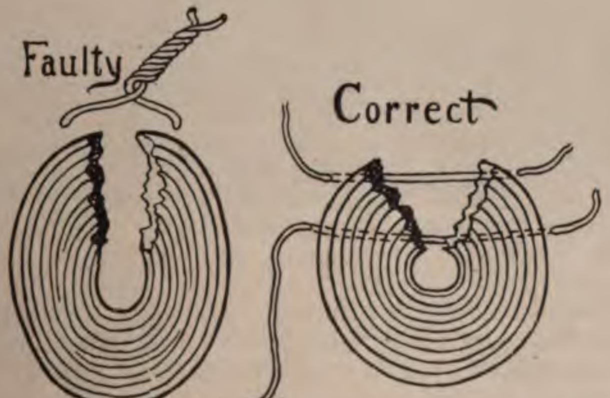

Fig. 249.—Suture to Unite the Ends of the Sphincter.

Heppner accomplishes the same object by a figure-of-8 suture, which closes both vaginal and perineal surfaces.

Martin more rapidly, and with a less complicated procedure, meets the difficulty. He, with a continuous catgut suture, unites the intestinal wound from the rectal surface; when he reaches the anus, with the same suture in a contrary direction he superimposes a layer up to the superior angle of the vagina, and if the denudation is deep, a third layer before the vaginal and perineal surfaces are united.

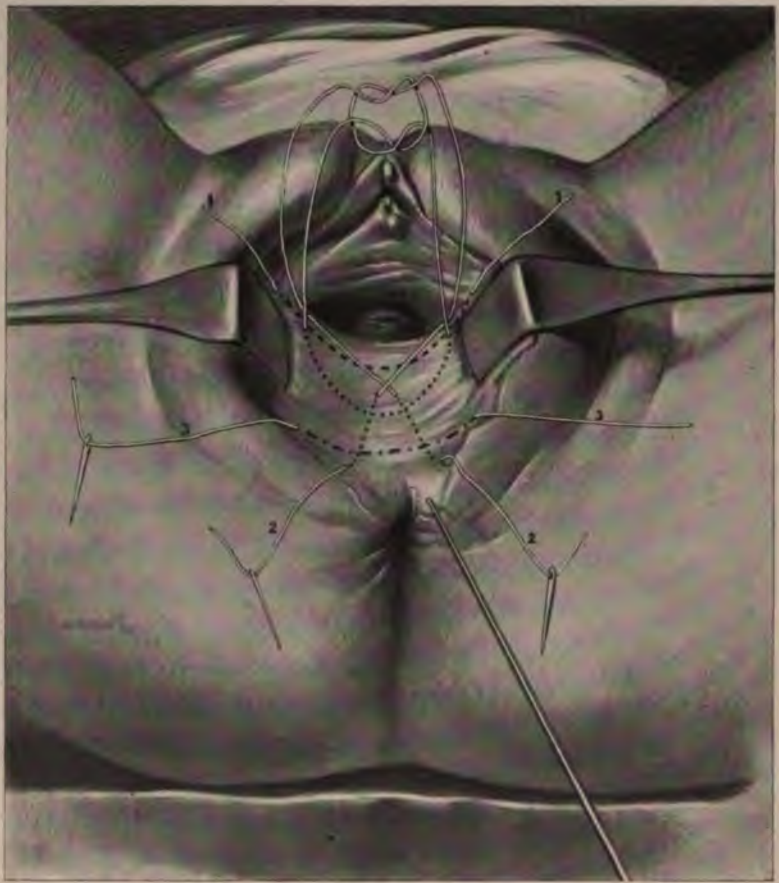

Fig. 250.—Outerbridge's Suture.

Freund has emphasized the necessity of securing such a denudation as would reproduce the original appearance of the tear. This, if there is a cicatrix, which presents the appearance of oo, the laceration from which it has contracted may be represented by figure 241. He incises the posterior column of the vagina at a certain distance from the scar and carries the bistoury backward along the sides of this column, circumscribing the cicatrix in the vagina and upon the labia majora, and completes the denudation as in an ordinary operation. The line

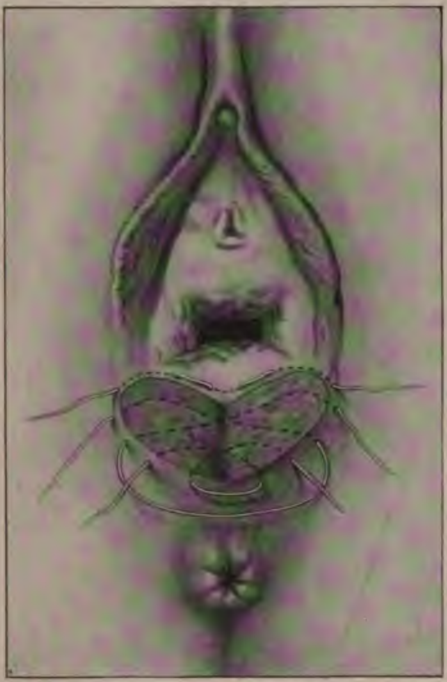

Fig. 251.—Cleveland's Suture.

which corresponds to the rectum is sutured, then each edge of the posterior vaginal column is united to the external margin of the denuded surface. The union of the lines forms the vulvar and perineal surfaces.

Emmet's operation is of especial value in relaxation of the posterior vaginal wall, and its purpose is to expose the fascia and so to introduce the sutures as to fold in the slack and lift up the perineum, bringing the parts more completely under the control of the levator ani muscle. With the labia separated by the hands of assistants, the summit of the protruding rectocele is seized with a double tenaculum; two other tenacula are placed one upon each of the caruncula, and a fourth upon the commissure of the vulva. When these are separated, they constitute a quadrilateral surface. These instruments are employed to render the parts tense, and the lines between them are employed as the boundaries of the denudation. The intervening surface is completely denuded. The sutures are then introduced in triangles, beginning in the sulcus upon either side. The sutures introduced form a double triangle; a suture joins the summit of denudation upon each side with the apex of denudation of the posterior column. This is called the crown stitch. A number of perineal sutures are then used. By this method the majority of the sutures are within the vagina. The securing of the sutures

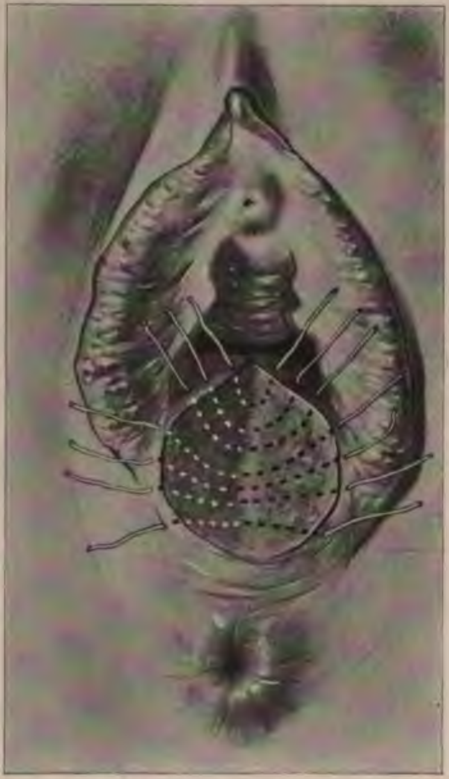

Fig. 252.—Dudley's Operation with Interrupted Sutures.

lifts up the pelvic floor and brings the posterior segment of the pelvic floor more closely in contact with the anterior. Noble modifies this operation by carrying his denudation higher upon the posterior column, by splitting the fascia and exposing the levator ani muscles. In suturing, he pulls out the muscle and secures it with not only the lateral, but also the central sutures, or those below the crown suture. This brings the muscles in contact in front of the rectum and insures a strong support to the pelvic floor.

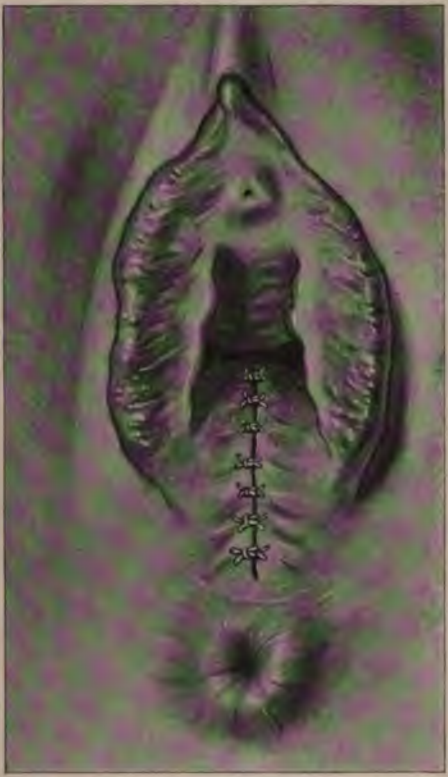

Fig 253.—Dudley's Operation Completed.

Emmet's operation for complete laceration has for its first and principal aim the restoration of the sphincter ani. The first suture is introduced and brought behind the ends of the torn sphincter, which have been carefully exposed in the denudation. As the suture is drawn up and secured, the precaution is taken to draw up and place in position the ends of the sphincter, so that they may be firmly secured. The remaining sutures appose the denuded surfaces of the perineum.

Outerbridge modifies Emmet's operation in that he uses but three sutures. The first, of medium-sized catgut, by means of a needle threaded with a carrier loop, is passed from the end of the central undenuded portion to the summit of the lateral denudation upon either side. It is thrown over the pubes and a silver wire suture is passed from the highest point of the denudation upon one labium majus beneath the whole wound across to the corresponding point upon the opposite side. The catgut suture is now tied and its ends are passed downward to penetrate the skin upon each side one centimeter from the lowest point of the

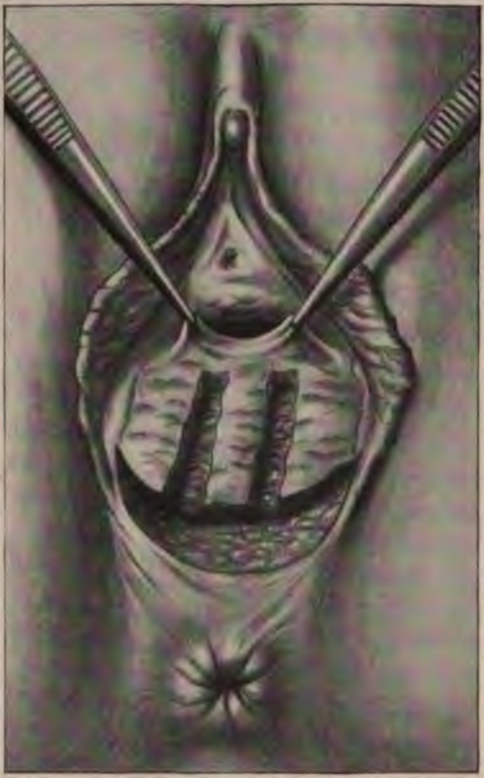

Fig. 254.—Denudation for Martin's Operation.

denudation. This suture tied, the silver wire is secured. The latter suture is removed upon the eighth day.

Cleveland uses a figure-of-8 suture of catgut. The first suture enters the skin six millimeters from the wound margin and midway between the posterior commissure and the summit of the denudation in the left labium, passes deeply across between the denuded surface and rectum, embracing the muscles, and emerges upon the right labium six millimeters from the wound margin and midway between the posterior commissure and the point corresponding to its entrance, is reintroduced at a similar point upon the left labium, and emerges upon the right, directly opposite its original entrance.

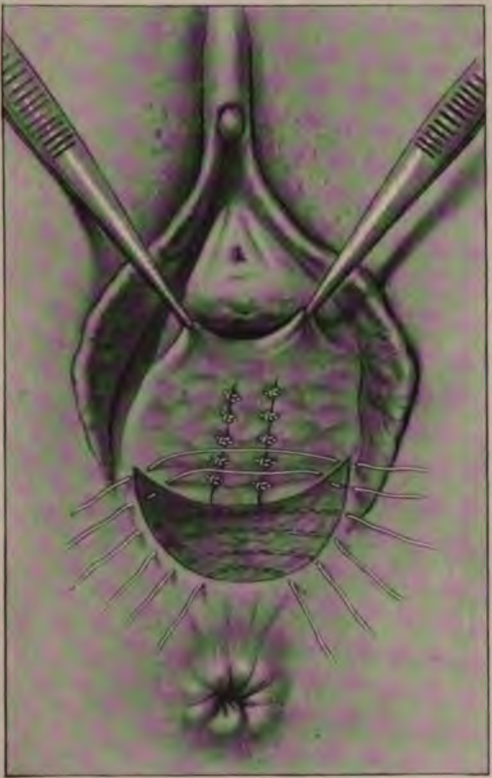

Fig. 255.—Vaginal Surfaces United ; Perineal Sutures in Place.

The second suture follows a similar course. It enters the left labium near the summit of denudation, is buried beneath the edge of the denudation to the center of the vaginal column, then passes downward, and emerges upon the right labium midway between the summit of denudation and the exit of the first suture. It is introduced upon the left labium at a corresponding point, passes across its former course, follows the border of the right sulcus, and emerges beneath the right summit.

A suture of wire or silkworm-gut, for support, is passed through the left labium about eight millimeters above the denudation, and about the same in the anterior vagina and the right labium.

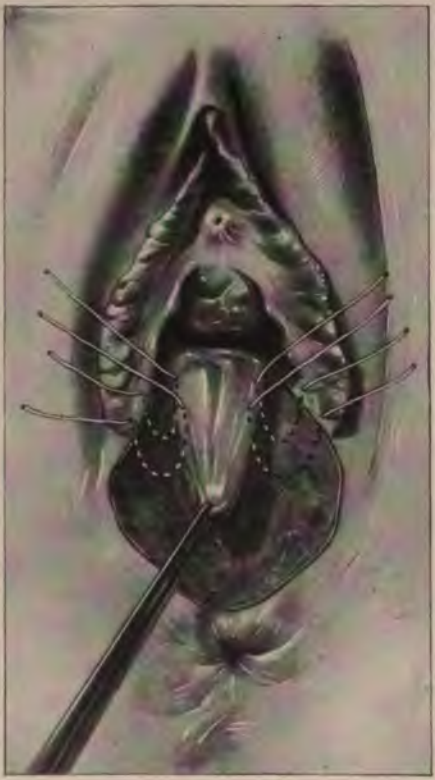

Fig. 256.—Bischoff's Operation.

A. P. Dudley makes a quadrilateral denudation with angles at the summit of the rectocele, laterally at the caruncula, and at the posterior commissure. The denudation removes only the mucous layer, preserving the submucous. The finger is introduced into the anus and the first suture is passed downward and forward to the median line, where it is brought out, reintroduced three millimeters from its exit, and carried upward and backward to emerge upon the other side of the vagina. This suture is tied, and acts as a fixed point from which to work. The remaining sutures, of juniper catgut, are made over and over and are introduced in a direction similar to the first, taking care to push up the rectocele with a director as each stitch is tightened. As the outlet is approached the angle of the sutures is decreased, until, when abreast of the hymen, they are passed transversely. At this point the inside work is finished and the suture is made fast. A number of buried sutures are passed through the fibers of the separated central tendon. These extend to the extremity of the rent, when, with a continuous suture, they return to the point

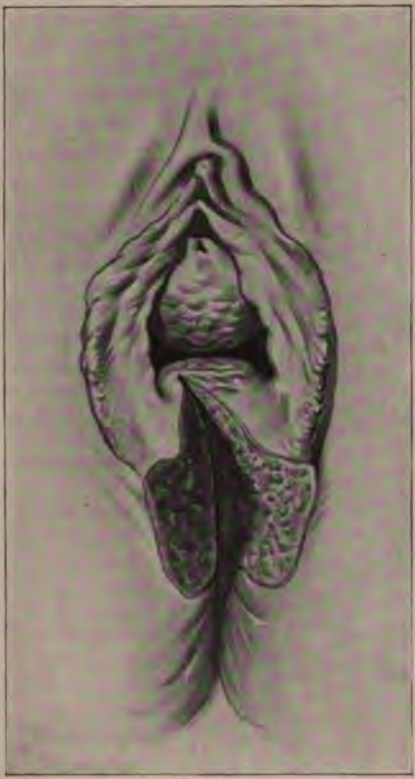

Fig. 257.—Denudation for Le Fort's Operation.

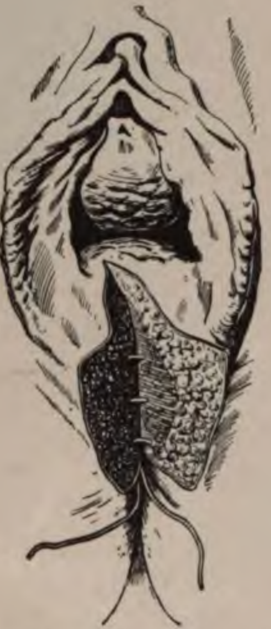

Fig. 258.—Rectal Sutures.

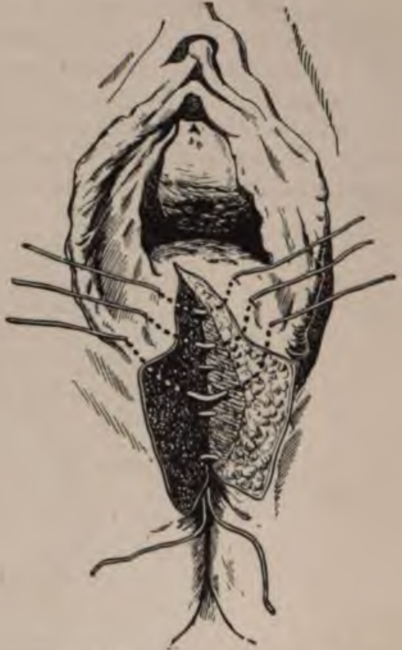

Fig. 259.—Vaginal Sutures in Place.

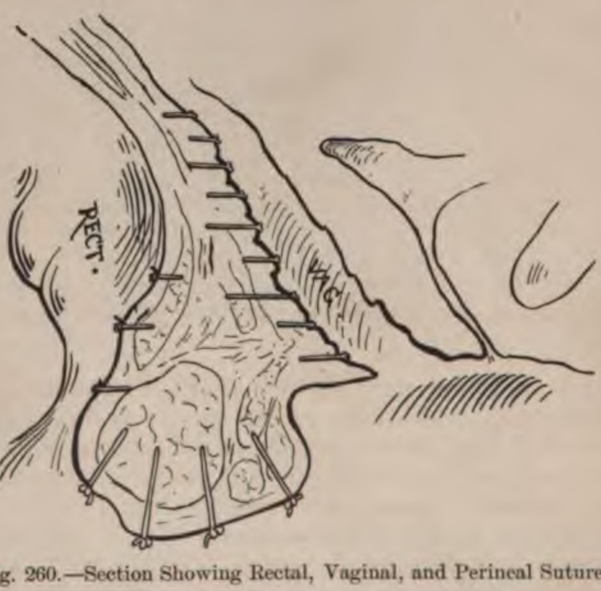

Fig. 260.—Section Showing Rectal, Vaginal, and Perineal Sutures.

where the deep sutures began. After examination of the wound for bleeding points or gaping of the surfaces, the wound is dusted with iodoform, and is not disturbed for four days.

Martin, in extensive relaxation of the pelvic floor, supplements the operation upon the vulvar outlet by a denudation of the lateral columns of the vagina, leaving a tongue-shaped, undenuded strip in the median line of the vagina. Each lateral denudation is obliterated by continuous suture, after which the outlet is closed by transverse sutures.

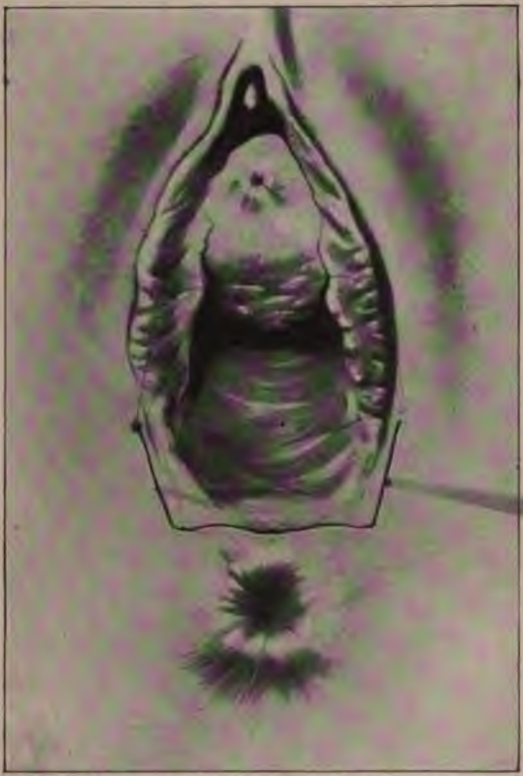

Fig. 261.—Incision for Tait's Operation for Incomplete Laceration.

Bischoff dissects up a flap from the posterior vaginal wall, which he utilizes in covering over the line of vaginal union. The perineal sutures are passed deeply beneath the flap.

Le Fort's procedure, applicable to complete lacerations involving the entire rectovaginal septum, is performed as follows:

A vertical incision one centimeter long is made in the intact portion of the septum, extending only through the vaginal surface; this is followed by a slightly convex incision extending to the junction of vaginal and skin surfaces. An incision is now made along the rectal border, and the extremities of these two incisions are joined by one along the perineal border. A triangular surface is thus marked upon each side, from which the skin and the cicatricial covering are removed. The vaginal portion of the septum is extended by raising up the convex flaps by further dissection until the opposite extremities of each side are upon a straight line. The additional raw surface thus formed is destined to be united with the similar one of the opposite side. The rectal portion is secured by sutures introduced and tied from the rectal surface. The vaginal portion is closed

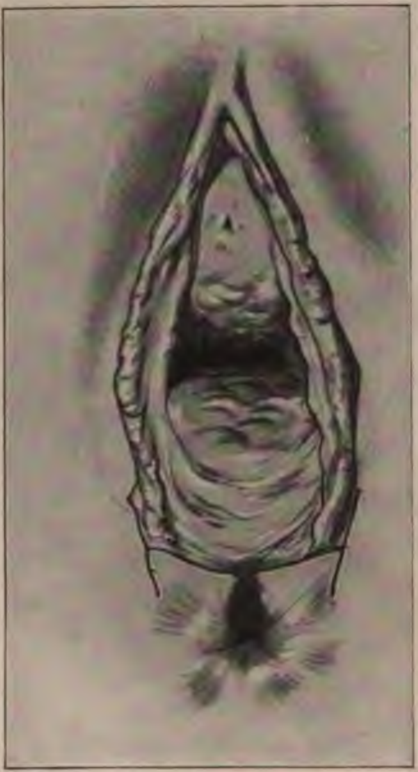

Fig. 262.—Line of Incision for Tait's Operation for Complete Laceration.

by bringing in contact the upper part of the triangular denudation. The sutures are introduced and brought out well beyond the line of denudation in order to turn the flaps up in apposition. Before the vaginal sutures are tied the perineal sutures are inserted.

Flap Operations.

Tait's operation is the representative for the various flap operations. In incomplete tears the rectum is tamponed with a sponge or with cotton or iodoform gauze covered with vaselin and furnished with a thread. While an assistant separates the vulva, two fingers are passed into the rectum, rendering the posterior wall tense. To form the flap, Tait uses pointed angular scissors. The point of one blade is inserted in the median line at the mucocutaneous junction, and the rectovaginal septum is split to the

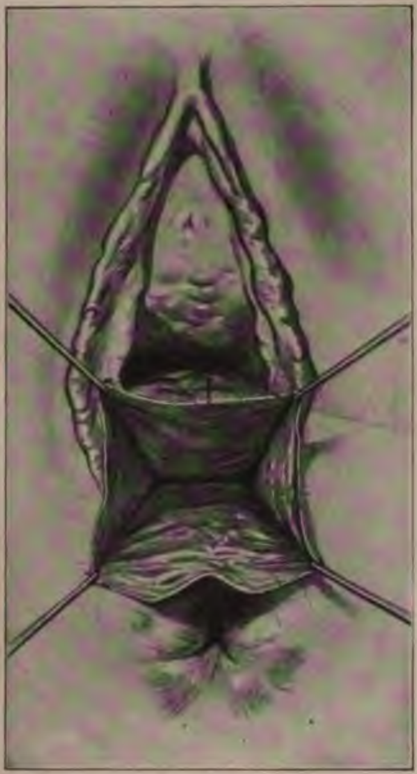

Fig. 263.—Appearance of Surface after Formation of Flaps.

depth of two centimeters, first to the left and then to the right, and is carried forward upon each side to the point at which he wishes the posterior commissure to be. This forms a semicircle following the mucocutaneous junction. The flap is drawn up by tenacula and is further separated to the required depth. On the borders the incision is carried deeply into the cellular tissue of the perineum and labium majus. Bleeding is controlled by forceps, and later by the pressure of the sutures. The sutures are passed with the fingers in the rectum as a guide. They pass transversely across the wound, the skin not being included. Four sutures are generally sufficient. The sutures are secured after the wound has been washed with sublimate solution (1 : 1000) and the tampon has been removed.

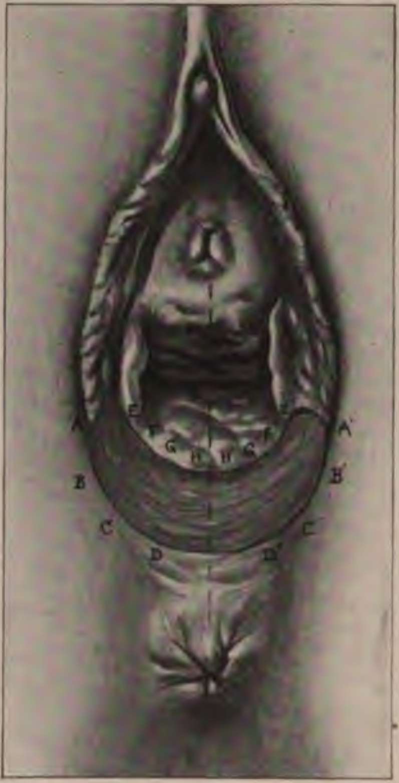

Fig. 264.—Edebohls' Operation, Showing Denuded Surface. Inclosing Points Marked with Corresponding Letters Lie in Contact.

Sanger closes the skin edges with superficial sutures.

In *complete laceration* the rectovaginal septum is split, forming a rectal and a vaginal flap, depending in extent upon the depth of the tear. Sanger advises that it be made with the bistoury. These flaps are loosened at either extremity by prolonging the incision upward just within the labia, and downward alongside the anus, thus forming a letter H, the transverse bar of which is formed by the split in the septum, and is at the lower part of the letter. These flaps, when separated, form a quadrilateral. Great care must be exercised in the introduction of the first suture, which must include the ends of the sphincter ani.

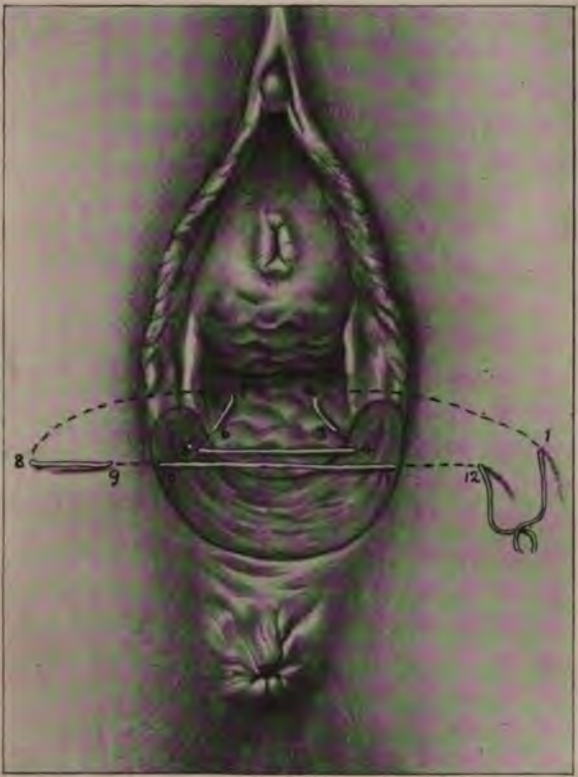

Fig. 265.—Plan for Introduction of Sutures. Figures Indicate Course of Introduction of Sutures.

Edebohls, in rectocele, carries the dissection close beneath the vaginal mucous membrane, up to the summit of the protrusion, and cuts away the anterior flap, leaving an elliptic denudation. Four sutures are generally required for the union; as they are all applied alike, the description of one will answer. A semicircular curved needle is threaded with silkworm-gut. The needle, held by a needle-holder, is made to penetrate the skin at the left of the wound, two centimeters from its margin. It is carried by a semicircular sweep through the tissues into the vagina at the same distance from the wound margin, penetrates the wall of the vagina six millimeters from the wound margin, passes beneath the mucous membrane to emerge again in the vagina upon the opposite side, and passes beneath the wound upon the right side as upon the left. After the sutures are introduced the end at 8 is re-threaded upon a short, straight needle, carried through the skin at 9, six millimeters from the wound margin, thence along beneath the skin, emerging in the wound at 10, re-entering the opposite surface at 11, to emerge upon the skin at 12. The wound is freed from clots and dried, and the sutures are tied. The sutures are removed on the ninth or tenth day. The advantage claimed is that the union is firmer. The majority of operators now prefer to introduce the sutures through the skin in Tait's operation, including about ½ of a centimeter of the skin upon each side. Care must be exercised not to extend the flaps beyond the vulva. I have seen two cases in which a subsequent plastic operation was required to remove a cicatricial band from the vulva, which caused great discomfort in sitting and walking.

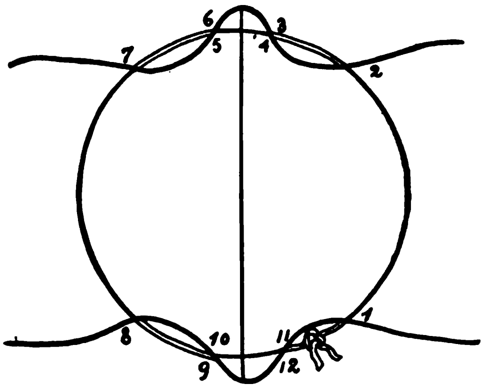

Fig. 266.—Effect of the Suture. A Section Along the Course of a Tied Suture.

Simpson's method is somewhat similar to Tait's in the manner of forming the flaps, but the flaps are sutured separately, forming the anterior wall of the rectum and the posterior wall of the vagina, while the intervening funnel-shaped raw surface is united by sutures.

Fritsch's procedure still more closely resembles Tait's in the splitting of the flaps. He detaches the rectum from the vagina, adds a lateral incision for the sphincter when its ends are retracted, and unites these with a provisional stitch, which serves during the operation to restore the shape of the orifice and to permit the accomplishment of reunion. He unites the rectum with catgut, using the Lauenstein suture. The same suture is used to close the vagina, and the perineum is completed by suture in superposed planes or by continuous catgut sutures in terraces.

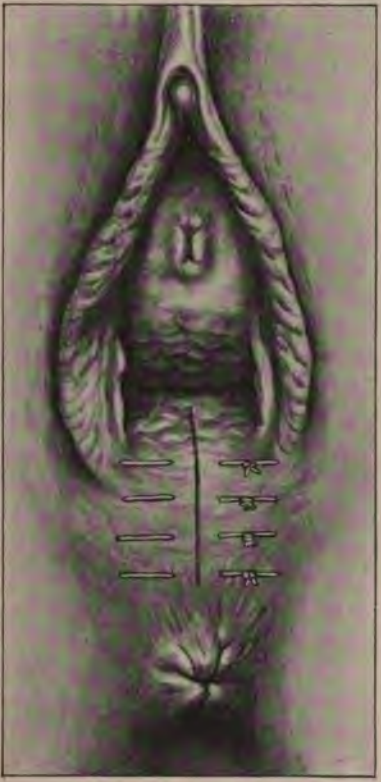

Fig. 267.—Wound Closed.

Alexander Duke, after introducing the left index-finger nearly its entire length into the rectum, with a double-edged bistoury penetrates the septum a distance of six centimeters; as the knife is withdrawn he enlarges the incision laterally to five centimeters. As the lateral ends of the incision are pressed toward each other a lozenge-shaped opening appears. The sutures are introduced with a strong, sickle-shaped needle with eye in point, and silver wire is preferred for the suture. The needle is introduced just beyond the end of the incision, and, guided by the finger in the rectum, is made to encircle the incision, to be brought out beyond its opposite end. Drawing up this suture will give an idea of the number of additional sutures required. The sutures secured, the distance between the anus

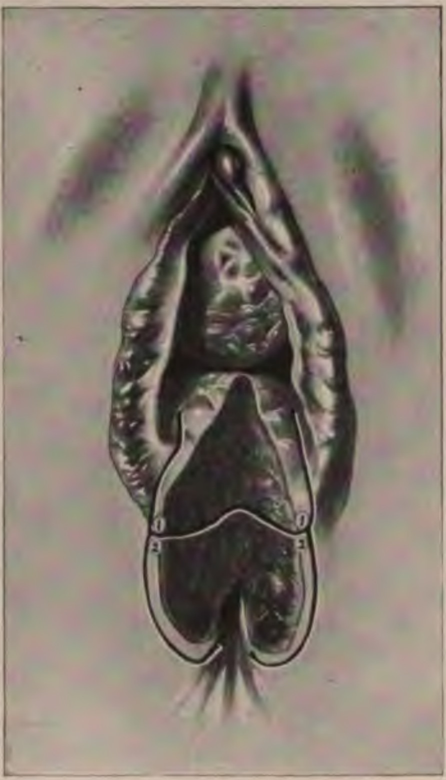

Fig. 268.—Incision for Simpson's Operation.

and the posterior commissure is considerably increased, with the formation of a thick perineal body.

300. After-treatment.—Immediately after operation cleanse the vulva with a disinfectant solution, dry, and dust with iodoform, boric acid, or a mixture of the two, and apply a gauze pad held in place with a T-bandage. Pain may be allayed by an iodoform suppository, or, when very severe, by a dose of opium and hyoscyamus, given either per oram or per anum. Permit the urine to be evacuated spontaneously; if the patient can accomplish it while lying down, allow a small quantity of antiseptic fluid to flow over the surface to neutralize the urine, and then reapply the powder. The position of the patient may be changed, but she should be discouraged from making severe efforts. In in-

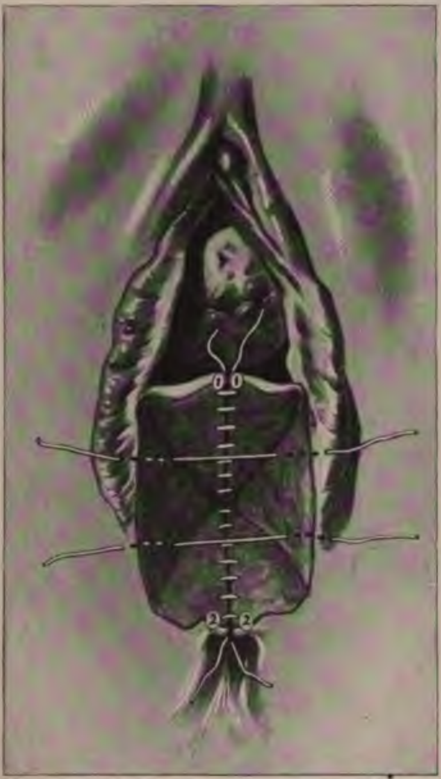

Fig. 269.—Flaps United which Reform Vaginal and Rectal Walls.

complete lacerations the diet will not require careful scrutiny, but in the complete it should be limited during the first week to animal broths, and subsequently for another week it should be restricted to articles that are easily digested. Secure an evacuation of the bowels upon the third day, and at least each alternate day subsequently. Exercise care that excessive purgation shall not occur. The sutures can be removed in from eight days to two weeks. Observe care in the removal of the sutures; the patient is preferably placed upon her side before a good light, and an assistant gently separates the buttocks and exposes the ends of the sutures and facilitates their withdrawal. Keep the patient in bed full three weeks. After the fourth day the vagina may be irrigated once or twice daily with a disinfectant solution—

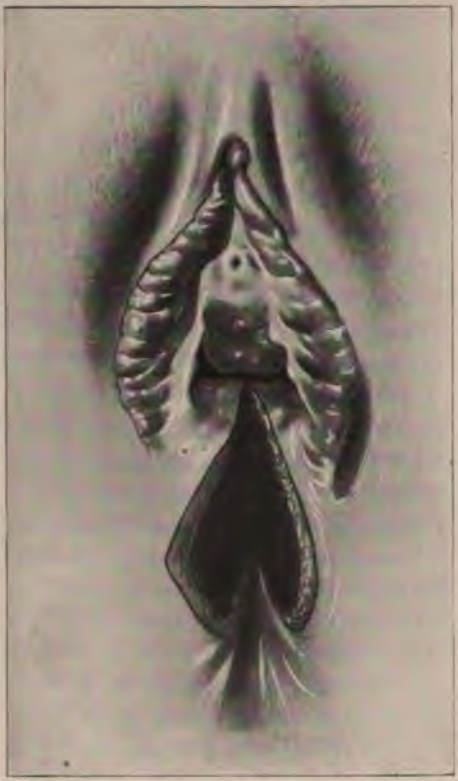

Fig. 270.—Denudation for Fritsch's Operation.

sublimate (1 : 2000) or formalin (1 : 1500). Advise her to do but little walking for a month, and interdict coition for two months.

301. Choice of Operation.—It should be understood that no operation is applicable to every patient. The operation should be adapted to the special condition. In incomplete tears, without rectocele, the Simon-Hegar operation is satisfactory; with rectocele, Emmet's or Dudley's operation will serve excellently. In complete laceration no procedure presents so many advantages as that described by Tait and modified by Sanger.

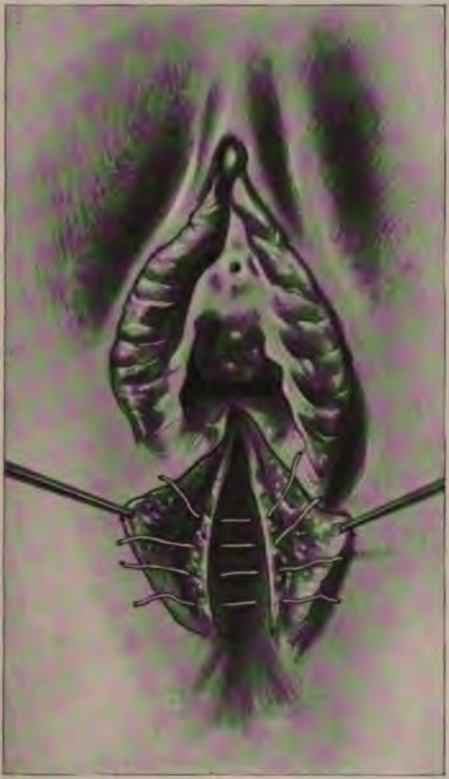

Fig. 271.—Catgut Sutures for Union of the Rectal Wall.

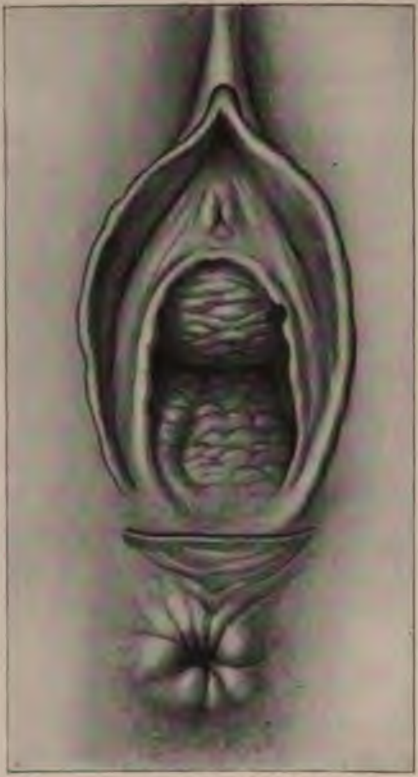

Fig. 272.—Incision for Duke's Operation.

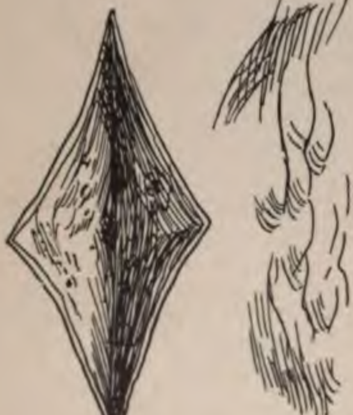

Fig. 273.—Incision Separated in Vertical Direction.

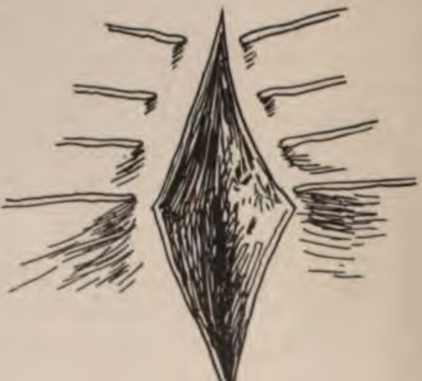

Fig. 274.—Incision United by Transverse Sutures.

INFLAMMATION.

302. Inflammation of the Entire Genito-urinary Tract.—The study of the development of the genital tract has demonstrated that the tubes, uterus, and vagina have arisen from the Müllerian ducts, which have coalesced to form the two latter organs. The genital canal is consequently a continuous canal, subject in every part to the effects of inflammation. It is rarely found that inflammatory changes are confined in a single portion of this tract, to the exclusion of others. It can not be questioned, however, that the special structure of certain portions of the canal renders them more susceptible to the influence of specific poisons. The cervical canal, with its cylindric epithelium, is more vulnerable to gonorrheal infection than is the pavement-lined vagina. The recognition of the almost continuous uniformity with which other parts of the canal become involved from the structure primarily infected, and the frequent difficulty in isolating the primary site, have induced me to depart from the usual order in the consideration of this subject and to discuss inflammation as affecting the entire genito-urinary tract, and subsequently to consider the features of its local manifestations.

303. Micro-organisms as a Cause.—The most important influence in the production of inflammation of the genito-urinary tract is due to the existence of micro-organisms. Inoculation of a mucous surface by a micro-organism may result in an immediate inflammatory reaction, which may subsequently extend to the neighboring structures by one of three ways: the mucous membrane, the lymphatics, and the blood-vessels. The original site of inoculation may be the vulva, vagina, uterus, or urethra, or the bladder surfaces, which are more or less exposed to external contact.

304. What Serves to Protect against Infection.—The situation of the genital tract, the injuries to which it is exposed, and the opportunities for its infection by various germs make the comparatively infrequent occurrence of inflammatory attacks surprising. The immunity against inflammation is induced by the difference in the character of the uterine and vaginal secretions. We will remember that the uterine secretion is alkaline, that of the vagina acid; consequently micro-organisms which may readily flourish in the one canal are unfitted for the invasion of the other.

305. How Immunity is Lost.—Any condition, then, which causes these secretions to be less antagonistic, or which causes the one greatly to preponderate, promotes the activity of the germs and their products. Lowered vitality, exposure to cold, menstruation, all render the secretion more alkaline and establish a better soil for the development of the micro-organisms. Such a condition may be established at once by inoculation with some virulent poison.

306. Varieties of Inflammation.—Inflammation may be acute or chronic, diffused or circumscribed. It is denominated as *acute* when associated with pain, heat, burning, more or less swelling of the tissues, and a profuse discharge.

Inflammation is *chronic* when the pain is less severe or but slight and the discharge less irritating, and when the structures have undergone round-cell infiltration and an increase of connective tissue. Diffuse inflammation may involve the entire genital tract, as in streptococcic or gonococcic infection, either of which may extend the entire length of the genital canal, involving vulva, vagina, uterus, and tubes, as well as ovaries and peritoneum. The latter form of infection may simultaneously invade the urinary tract, but circumscribed or local inflammation, confined to a portion of the tract, is much more common.

307. Causes.—The causes of inflammation have been divided into three classes: *first*, those which arise from disturbance of menstruation and involution; *second*, from septic causes; and *third*, from traumatism.

The *first* class includes improper hygiene of menstruation, exposure to cold, fatigue, overexercise, and excessive sexual relation during the congestion immediately preceding or following menstruation. Not infrequently persons, to avoid the inconvenience of menstruation, will take a cold bath with a view to its arrest; a prolific cause is neglect or imprudence following an abortion, miscarriage, or parturition. The natural congestion consequent upon such a period is enhanced by exposure, which develops inflammation, or the contact of micro-organisms results in disease and interferes with the normal processes. An acute or a chronic inflammation results.

Second.—Septic causes may include infection during an abortion, an operation, an examination, or a uterine or vaginal douche; from masturbation or handling the parts with infected hands; through instruments or other substances introduced into the genital tract. Infection may secondarily involve foreign bodies left in the uterus or vagina, such as portions of decidua or placenta, retained after abortion or parturition, stem-pessaries, tents, and tampons.

Microbes situated in the vulva or associated with vaginal disease may enter or may be carried into the endometrium. The germs most commonly thus found are the streptococci, the gonococci, and various saprophytes.

Third.—Lacerations of the perineum, vagina, and cervix, unskilful management of abortion or parturition, rough or unskilful examination, careless use of the sound or intra-uterine manipulation without asepsis, and excessive and violent coition.

Chemic and vegetable poisons, such as phosphorus and the essential oils, may cause acute metritis.

A patient suffering with chronic inflammation may have acute attacks generated by overexertion, sexual excess, operations, or rough examinations. Inflammation may be promoted by the presence of uterine displacements, pelvic or uterine tumors, or previous inflammatory exudates or morbid processes.

Inflammation of the vulva and vagina can be produced by the passage through them of a septic discharge from a sloughing fibroid, by malignant disease of the cervix or uterine body, by the contents of a pelvic abscess or pus-tube, or by the contact of feces or urine through fistulæ.

Of the various causes named, the most prolific are gonorrhea and traumatism. In woman gonorrhea is far more dangerous than syphilis, for when infection once occurs, the entire genito-urinary tract may become involved, and the individual subsequently suffer from chronic inflammation of the uterus, suppuration of the tubes, inflammation of the peritoneum and ovaries, as well as cystitis, ureteritis, and inflammation of the pelves of the kidneys. She not only loses through its influence her power of reproduction, but develops inflammatory conditions which, if they do not cause a fatal termination, produce such destructive changes in the pelvic organs as to necessitate their removal in order to prolong life or render it endurable. When gonorrhea has not established sterility, its existence affords a favorable soil for the development of sepsis, subsequent to abortion, parturition, or rough and unskilful manipulation. Careless examination, the introduction of the sound, and other intra-uterine manipulation without thorough asepsis are too frequently the causes of serious pelvic inflammations.

Acute exacerbations are readily produced by overexertion, fatigue, cold, or rough manipulation when the pelvic organs are the seat of chronic inflammation.

308. Symptoms of Acute Inflammation.—An acute inflammation of the genital tract produces pain, a burning sensation, heat, extreme sensitiveness, and constitutional reaction. It may begin with a chill or repeated rigors, followed by marked elevation of temperature and by tenderness over the pelvic organs so extreme as to render the contact of clothing or bedclothing quite unendurable, especially when the peritoneal surface has become involved. Discharge is a general symptom, somewhat dependent upon the seat and character of the inflammation. The functions of the genital organs are necessarily affected. In severe inflammation the parts are so sensitive that an examination with the finger is associated with agonizing pain. Menstruation may be arrested (amenorrhea) or may become very profuse (menorrhagia); not infrequently there is a profuse, irregular bleeding (metrorrhagia). Hemorrhage is more likely to occur when the inflammation has involved the peritoneum or cellular tissue, when the resulting exudate obstructs the uterine venous circulation.

Occasionally, hemorrhage is internal, producing a hematocele. More frequently the serum and plasma of the blood transude into the pelvic cellular tissue and form the condition known as parametritis or pelvic cellulitis.

309. Classification of Inflammation.—As inflammation preponderates in a portion of the genital canal or pelvic structure it is named for the part mostly affected.

Inflammation	of the	vulva,	vulvitis.
"	"	ducts and glands of Bartholin,	Bartholinitis.
"	"	urethra,	urethritis.
"	"	bladder,	cystitis.
"	"	vagina,	vaginitis.
"	"	uterus,	metritis.
"	"	tubes,	salpingitis.
"	"	ovaries,	ovaritis or oophoritis.

Inflammation is still more minutely classified in relation to the particular structure or portion of the organ involved, as the mucous membrane, the wall of the organ, or its periphery. Thus, the vagina may present an endovaginitis, or parenchymatous vaginitis, and a peripheral or perivaginitis. The *uterus*, an endometritis, a parenchymatous metritis, a perimetritis (the latter involving the peritoneal covering), and an inflammation of the cellular tissue—a parametritis, or, better, a pelvic cellulitis. The tube is affected by endosalpingitis, parenchymatous salpingitis, and perisalpingitis. Inflammation of the serous covering of the uterus, as announced, is known as perimetritis. It is, however, rare to find this portion of the peritoneum alone involved. More frequently the entire pelvic peritoneum, including that of the uterus, broad ligaments, and tubes, is inflamed, so that the term pelvic peritonitis affords a more accurate description. Inflammation of the pelvic peritoneum is rare without more or less involvement of the subjacent cellular tissue. It can not be denied that we may have cellular inflammation without involvement of the enveloping peritoneum. When this occurs, it is known as pelvic cellulitis.

310. Varieties of Vulvitis.—Inflammation of the vulva may be divided into simple or catarrhal, follicular, venereal, eruptive, phlegmonous, and diphtheric.

311. **Causes.**—The catarrhal and follicular varieties are frequently produced by neglect of cleanliness. The retention of the secretion from the sebaceous and sudoriferous glands, and the accumulation of decomposing smegma between labia majora and minora, cause an inflammation similar to that of balanitis in the male. Vulvitis is produced by uterine and vaginal discharge, particularly that which is associated with malignant disease. The continual soiling of the parts with the discharge from urinary and fecal fistulæ results in inflammation; not infrequently in erosion of the exposed surfaces. Vulvitis may arise from masturbation, from excessive coition, from contact of the surfaces in fat women, from pin-worms, ants, and from the scrofulous diathesis. It may be produced by the various eruptive diseases of the skin, as eczema, herpes, acne, furuncle, warts, and venereal sores. It is not an unusual sequel of diabetes, in which the sugar-containing urine decomposes from the presence of torula cerevisiæ, which form whitish tufts over the surface of the vulva and buttocks, and is associated with the most intense pruritis.

312. **Vulvitis—Simple or Catarrhal.**—In the acute stage of *vulvitis* the labia minora, the clitoris, and the fourchet are swollen and thickened. The parts are red, angry, and dry; later, covered with a profuse purulent discharge of an extremely offensive odor. This discharge is produced by an increased secretion of the sebaceous glands mixed with desquamated epithelium and pus-corpuscles.

Pruritus, as in all forms of vulvar inflammation, is a marked symptom, and is at times so severe as to prevent sleeping and force the patient to abjure society. The temptation to scratch or rub the parts becomes almost irresistible. The contact of the urine causes smarting or burning. As the disease becomes chronic, the surface is not so bright a red; it becomes abraded; at points, small ulcers form, or the papillæ become hypertrophied, bleed easily, and are red; often the surface presents points of excoriation, which extend upon the vulva into the groins and the inside of the thighs, when the itching is intolerable. The glands in the groin may become swollen, and may even undergo suppuration.

313. **Follicular Vulvitis.**—The follicular inflammation is limited to the hair follicles or originates in the sudoriferous and sebaceous glands. The surface of the vulva is studded with small round protuberances the size of a millet-seed or hemp-seed. These elevations begin as papules, which may suppurate, forming

pustules, which burst and shrivel, or they may remain as small indurations. The intervening skin is unaffected.

314. Venereal Vulvitis.—Venereal inflammation of the vulva is produced by gonorrhea, syphilis, and chancroid. The former is the most prolific source. Gonorrheal vulvitis is much more intense than the catarrhal. The external meatus of the urethra and the orifice of the ducts of Bartholin are generally red and swollen. The inflammation extends to the vagina; not infrequently through the urethra to the bladder; and often Bartholin's glands are inflamed, occasionally resulting in abscess. Micturition is followed by intense burning. Examination generally reveals the gonococcus. Vulvitis from syphilis occurs in the form of the single sore, with indurated base and excavated surface, situated upon the large or small labium, or in the neighborhood of the clitoris. In the secondary stage there are mucous patches similar to those found in the mouth. Chancroids produce a more or less extensive ulceration, generally involving adjoining surfaces; syphilis causes indurated enlargement of the inguinal lymphatics, while the latter is characterized by their inflammation and suppuration, causing the formation of buboes.

315. Eruptive Diseases of the Vulva.—Skin diseases manifest the same characteristics when situated upon the vulva as in other portions of the body. The most important, because the most frequent, are eczema, erysipelas, and herpes.

Eczema is situated upon the labium majus or upon the mons veneris, from which it extends to the thighs, perineum, anus, and over the buttocks. In the acute stage the surface becomes red and swollen, burns, and is covered with transparent vesicles the size of a pinhead. It is associated with fever, gastric irritation, and rheumatic symptoms, and becomes chronic by the end of the second week. The chronic form is generally eczema rubrum; the surface is covered with pus, dry scales, or crusts, and fissures form at the fourchet and anus and in the genitocrural folds. Exacerbations occur at the menstrual periods. Pruritis is intolerable. The occurrence of eczema of the vulva is generally associated with the appearance of the disease upon other parts of the body. It is a frequent consequence of diabetes mellitus, owing to the irritation of the sugar-containing urine. It is also an outcome of the rheumatic diathesis.

Erysipelas may occur as a primary affection of the vulva in the new-born, when it is a very serious disease, frequently proving fatal. It may occur periodically with the catamenia, or may even take the place of the latter. Its occurrence during the puerperal state is generally an indication of serious infection.

Herpes appears as small transparent vesicles, from the size of a pinhead to that of a pea, which may be few or multiple, discrete or confluent; rarely, as a single erosion of large extent. Its appearance is characterized by heat, smarting, and an area of redness, which is covered with agminated vesicles. These vesicles may fuse, forming a large bulla. The vesicles dry; the edges of an ulcer are scalloped and its surface is covered with a crust, beneath which cicatrization is completed within from eight to fifteen days. The inguinal glands are engorged and painful, but do not suppurate.

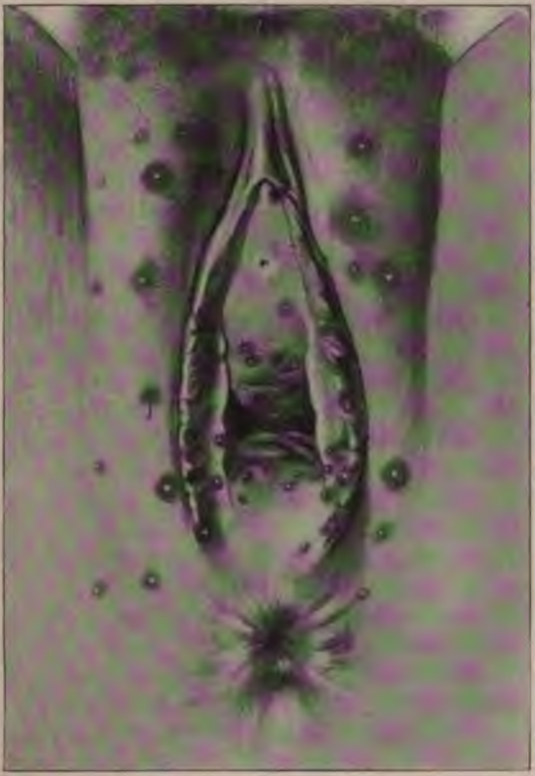

Fig. 275.—Follicular Vulvitis.

Causes.—Accidental herpes is caused by syphilis, gonorrhea, filth, and constitutional conditions. Congestion is a predisposing cause. In some it occurs each month two days in advance of menstruation; also during pregnancy.

316. Phlegmonous Vulvitis.—Phlegmonous inflammation of the tissues may be catarrhal or may be the result of violence. It affects the deeper structures and subcutaneous tissues, resulting in serpiginous ulceration, which forms a permanent fistulous tract, or in the formation of an abscess.

317. Diphtheric Vulvitis.—Diphtheria may, but rarely does, affect the vulvar mucous membrane. The so-called diphtheric vulvitis is an exudation found upon lesions of the vulva and vagina, produced by parturition, and is the result of septic infection. Such exudations are also found in grave constitutional disorders, such as scarlatina, smallpox, and typhoid fever.

In a woman who succumbed to sepsis subsequent to the delivery of an intra-uterine sessile fibroid I saw, prior to death, the vulva, vagina, and uterus lined with a diphtheric exudate.

318. Diagnosis of Inflammatory Disease of the Vulva.—The diagnosis, especially the differential diagnosis, of the inflammatory disorders of the vulva is of great practical importance. Gonorrheal vulvitis is recognized by the greater intensity of the symptoms, increased burning during micturition, profuse purulent discharge, and redness of the meatus and orifices of the ducts of Bartholin, and by its tendency to extend to the tubes, ovaries, and peritoneum, as well as the increased tendency to involve the urinary tract. Its recognition is rendered certain by the discovery of the gonococcus, and the known fact of exposure to the virus. The absence of the gonococcus is not proof positive against the specific character of the disease, as the germ may have disappeared. The examination for the gonococcus is made as follows: "A drop of the discharge is compressed to a thin layer between two slides, which are separated and dried, when they are placed for five minutes in a dilute solution of carbol-fuchsin, washed with water, and again dried. Cultures can be made in serum tubes which contain equal parts of human blood-serum and a watery solution of two per cent. agar, one per cent. peptone, and one-half of one per cent. sodium chlorid. In from forty-eight to seventy-two hours they will yield large colonies of gonococci for microscopic examination" (Byford).

The vulvovaginitis in the young girl is generally the result of gonorrhea; the fact should not be overlooked that it may arise from want of cleanliness after stool, affording an opportunity for the entrance of such intestinal parasites as pin-worms.

The production of vulvitis in the virgin by masturbation is recognized by finding the smaller labium and the space between it and the hymen covered with small, pointed excrescences; the nymphæ elongated; the clitoris or its prepuce irritated; swelling of the shallow groove between the orifice of the urethra and the clitoris; clear, abundant secretion from the ducts of Bartholin; abnormal sensibility; exaggerated prudery; and distinct hysteric phenomena. Discontinuance of masturbation may be recognized by the hypertrophied nymphæ becoming soft and no longer showing indications of inflammation.

Eczema can be recognized as a result of diabetes by finding sugar in the urine and tufts of the torula cerevisiæ upon the the inflamed surface.

Herpes is distinguished from chancroid by its early history; the formation of a vesicle is followed by its rupture, leaving a raw surface, without a thickened inflammatory base, and without loss of substance. The burning is more acute and the inflammatory symptoms subside more quickly. The lymphatic glands of the groin may become inflamed, but do not suppurate. The duration of herpes is from eight to fifteen days. In chancroid the sore has an uneven, fissured base, the edges of which are sharply defined, its surface being covered with a greenish discharge. It presents points of abrasion, and generally the apposed surface becomes inoculated. Bubo develops in the groin.

319. Treatment.—In the acute form the treatment is absolute rest and the administration of salines; tincture of aconite may be given in drop doses every one or two hours to decrease inflammation. In the diphtheric and phlegmonous varieties quinin, tincture of chlorid of iron, and alcohol should be given. In all varieties thorough local cleanliness must be observed. In the simple and follicular varieties not infrequently cleansing and isolation of the inflamed parts will be sufficient to establish a cure. The cause of the inflammation, if possible, should be determined, and, when practicable, remedial measures should be directed to its removal. Vaginal discharge should be arrested or the inflamed surfaces should be preserved from its contact. The rheumatic, gouty, and scrofulous diatheses and improper habits must be corrected by proper hygienic and constitutional measures.

Catarrhal and Gonorrheal Vulvitis.—Locally, a hot sitz-bath several times daily; antiseptic fomentations; a gauze pad wet with sublimate solution (1 : 1000 or 1 : 2000), carbolic acid (1 : 20), or a boric acid solution (1 : 50) placed over the vulva and covered with oiled silk or rubber dam. Such a dressing may be kept hot by the external application of a hot-water bag. In very acute conditions the distress will be more quickly ameliorated by fomentations with lead-water and laudanum. These applications, whether antiseptic or emollient, should be frequently changed, the parts protected from vaginal discharge by a tampon, and the inflamed surfaces painted several times daily with a solution of Monsell's salt (1 : 8) in glycerin; on each alternate day with silver nitrate (gr. x to f℥j) or with compound tincture of iodin in water (1 : 2). The sides of the vulva should be separated with absorbent cotton, surgeon's lint, or prepared oakum. After the subsidence of the more acute stage, dust the surfaces with zinc oxid, bismuth subnitrate, iodoform, lycopodium, starch, talcum, or one of the various combinations of these powders. Iodoform and tannin in equal parts are very efficient. Equal parts of powdered alum and sugar afford relief in pruritis.

In *chancroid* cleanliness, isolation of the inflamed area, and the use of drying powders—iodoform, iodoform and tannin in equal parts, aristol and desiccated alum (4 : 1)—are proper procedures. In *herpes* keep the surfaces clean and separated and use drying powders.

In *follicular vulvitis*, in addition to strong antiseptics, alkaline solutions are efficient. It may be necessary to shave the parts and to puncture and cauterize the individual follicles, or, in rare cases, to excise the affected surface. The ointment of ammoniated mercury, diachylon ointment, or ichthyol in lanolin ($\frac{1}{8}$–1 : 4) may be useful. *Phlegmonous and diphtheric vulvitis* require cleanliness, antiseptics, removal of sloughing tissue, and, in the latter, cauterization of the infected surfaces with strong carbolic acid.

In *eczema*, when acute, employ emollient and starchy applications, and exercise cleanliness; when associated with diabetes, compresses wet with a solution of hyposulphite of soda (℥ss, aq. Oj). In chronic eczema wash with a strong potash soap, by which all crusts and scales are removed. Dry the surfaces and apply an ointment, such as:

℞. Hydrarg. ammoniat., ... ℥ss
Lanolin, ... ʒij. M.
Ft. ungt.

℞. Iodoform, ... ʒj
Zinc oxid, ... ℥ij
Lanolin, ... ʒiij. M.
Ft. ungt.

Or diachylon ointment or one of the tar preparations may be employed. If the irritation is apparently kept up by a vaginal discharge, use a vaginal tampon. Laxatives should be given to regulate the bowels, and constitutional measures should be employed for the correction of arthritic, scrofulous, or diabetic conditions, from any one of which the disease may have originated.

320. Edema and Gangrene.—*Edema* of the vulva is not infrequent in pregnancy. It is common in ascites as a result of various obstructions of the circulation. It may result from varix of the external pudic vein shortly after labor. When it is situated in one side of the vulva, it is an indication of infection. Incisions of the vulva or spontaneous fissures permit the fluid to escape, but increase the danger of erysipelas, and may result in gangrene and sloughing of the labia. The swelling in general anasarca is very great, and may render urination or the use of the catheter very difficult.

A hard edema of one labium can occur from and persist after chancre. When it appears in the nymphæ or præputii clitoridis, it resembles elephantiasis. The condition is known as syphilitic hypertrophy of the vulva.

Gangrene of the vulva may result from traumatism, from septicemia, and in weak and scrofulous infants. This form of gangrene in young children is known as noma. It is infectious, presents a redness, an infiltration of the labium, an ichorous discharge, and a vesicle appears, which rapidly becomes gangrenous.

The treatment of edema is the same as that of the condition from which it arises. That of gangrene or noma consists in early excision, disinfection, and the exercise of measures to secure effectual nourishment.

321. **Bartholinitis** (*Inflammation of the Glands of Bartholin*).—These glands—also known as the vulvovaginal, Duverney's, and Cowper's glands—are racemose glands the size of a bean, situated in the labia majora at the junction of the posterior and middle thirds. The duct, two centimeters in length, opens in front of the hymen, with an orifice the size of a pinhead. Catarrh of these glands is rare, but hypersecretion is not infrequent. It is indicated by redness about the opening of the duct, which may be either dilated or closed; in the latter case forming a retention cyst. The secretion from these glands may be thrown off in paroxysms, not infrequently in nocturnal emission. The secretion is particularly discharged during erotic excitement.

Inflammation can occur in either the gland or the duct. It is generally due to specific infection, but may arise from streptococcic or staphylococcic forms. In very severe cases it is apt to be a mixed infection. It is most generally due to gonorrhea. Gonorrheal inflammation having been lighted up in the gland, it may subsequently remain dormant, and afford material which may infect not only the patient herself, but others coming in contact with the secretion. Inflammation, according to its virulence, may either result in the formation of a cyst or go on to the development of an abscess. Cysts are either single or multilocular, ovoid, with a smooth surface, and seldom transparent; the contents are viscid and are colorless or yellow. From mixture with blood they may become chocolate colored. The cyst attains a size from that of a nut to that of an egg, is generally unilateral, and is situated on the left side, elongated in the axis of the greater lip, and nearer the mucous surface. It seems elastic and compressible rather than fluctuating; it gives rise to discomfort in walking and in coition, and can become inflamed and suppurate. Superficial cysts, involving the duct, may be the size of a nut; they may be situated at the base of the labium minus, and may project into the vagina beneath the mucous membrane. A cyst of the gland is deep, is generally larger, and is located behind the labium majus; it elevates both labia and its duct is impermeable.

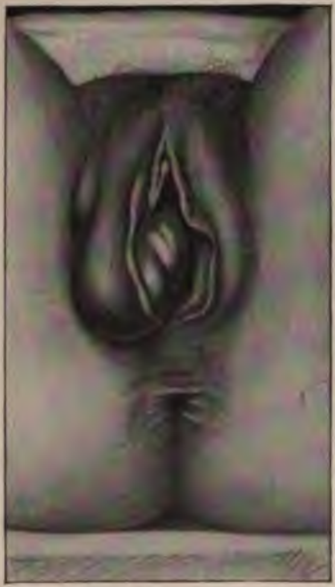

Fig. 276.—Cyst of Bartholin's Gland.

The diagnosis is readily determined. In either solid or fluid tumors fluctuation is absent, and the transparency is insufficient. But when the diagnosis is doubtful, it can be ascertained by puncture. The conditions with which it may be confounded are: first, sacculated cysts of old hernial sacs; second, hydroceles in the canal of Nuck; third, a cyst in front of a hernia. From hernia, which may be an epiplocele, an enterocele, or ovarian, it is distinguished by the absence of succussion in coughing, and by the determination of the connection of the mass with the abdomen. Hydrocele may frequently be displaced by pressure, is a larger tumor, gives more sensation of fluctuation, and is more translucent. Abscess may be secondary to the cyst or may originate from primary inflammation. Swelling and edema are marked over the posterior part of the vulva and about the anus, and the pain is acute and lancinating. The patient may have more or less fever; frequently, the urine is retained; fluctuation is distinct, and, if the abscess is not opened early, its contents may escape through several openings; pus is abundant and fetid. Fistulæ may persist, and may result in a rectovulvar fistula, or a large ulcer may be present, associated with purulent secretion, or a hypertrophic induration of the gland, with profuse discharge of milky, greenish pus. The gland is the last refuge of gonorrheal inflammation and is a frequent source of unsuspected infection for men. It may be confused with fecal abscess, phlegmòn of the labium majus, or furuncles. In fecal abscess there is more rectal disturbance, a more widely diffused inflammation, and the mass does not encroach to the same degree upon the labium. In phlegmon of the labium majus the inflammation is more external, and encroaches upon the cutaneous rather than upon the mucous surface. Furuncles are more sharply defined and present an indurated base.

Treatment. — In early inflammation of the duct it may be injected with a one per cent. solution of silver nitrate after evacuation of the pus. The duct may be opened with a lacrimal knife and a crayon of silver nitrate or a solution of zinc chlorid (1 : 50) may be introduced. In cysts, when the contents are evacuated by puncture, they quickly reappear. Obliteration of the cyst may be secured by injecting ten drops of a solution of zinc chlorid (1 : 10) after the contents have been removed by aspiration, or the cyst may be incised and packed with iodoform gauze. A preferable procedure would be extirpation. In order to overcome the difficulty of removing the cyst when opened, it may be punctured, irrigated with hot water, and injected with melted paraffin, and the latter hardened with ice, after which the mass thus formed is easily dissected. In abscess early, free incision at the junction of the skin and mucous surface is important. To extirpate the gland, wash the cavity with carbolic solution and pack with gauze. In fistula it may be wise to extirpate and to close the cavity with catgut sutures.

322. **Pruritis Vulvæ.**—Pruritis is a symptom of all forms of inflammation of the vulva. It results from the presence of pediculi, pin-worms, eczema, trichiasis; from hemorrhoids, disease of the kidneys, ureters, bladder, and urethra; from the congestion of the pelvic organs and masturbation; and from acrid vaginal discharges. It is associated with pregnancy, menstruation, the menopause, old age, the gouty diathesis, and general nervousness. It is directly caused by lice, acrid discharges, and diabetes. In addition to the sources given, there is a form of pruritis in which the origin remains undetermined. This is designated as an idiopathic pruritis.

Symptoms.—Pruritis produces intense itching, and, as a result of the scratching, excoriations, by which the hair is often worn off the mons veneris. The patient avoids company, becomes melancholy, has loss of appetite and sleep and increased sexual desire, masturbation is excited, and she may become insane.

Itching is continuous or occurs only at intervals, is increased by heat, and is much worse at night or following any exertion. The relation of masturbation to pruritis is not always readily determined. The habit produces certain abnormal alterations as a result of the irritation. Changes in the endometrium, glandular hypertrophy, ovarian irritation, increase of secretion, irritation and manipulation of the vulva. A bad circle is engendered; irritation causes masturbation, and this aggravates the inflammation. There are cases, however, in which most careful examination fails to disclose inflammation of the vulva as a source of the intense pruritis. These conditions are known as idiopathic pruritis, and are supposed to be due to nerve irritation. Such cases do not properly belong under the term inflammation of the vulva, but they are so rare, and the symptoms are so prominently associated with vulvitis, that their consideration seems more appropriate here.

Prognosis.—The relief of the condition depends entirely upon its cause. In some cases it is exceedingly obstinate. The removal of the cause, as filth, pediculi, or pin-worms, results in the removal of the disorder. The prognosis in masturbating alterations is by no means favorable. It may be exceedingly difficult to overcome the evil habit.

Treatment.—First remove the cause. When due to pediculi, the parts should be shaved and blue ointment should be applied. The most effective agent would be a strong sublimate solution—painting the surface with a solution consisting of one grain of corrosive sublimate to an ounce each of alcohol and water. Unless the parts are shaved this application must be repeatedly made, for it is necessary to destroy not only the lice which are present, but the spores. When the pruritis arises from the ascarus scabii (the itch insect), sulphur ointment or 35 grains of betanaphthol with 1 ounce of vaselin are efficient applications. Of course, in this disease the application must be made to the entire body.

The methods of treatment of eczema and vulvitis have already been given. When from pin-worms, the parts should be kept clean and the patient should be given fluid extract of senna and spigelia in half-ounce doses; rectal injection of infusions of quassia, two ounces to the pint; half a grain of sublimate to eight ounces of water; an injection of lime-water, or a suppository of five grains of santonin. Hemorrhoids, glycosuria, and other causes should be recognized and treated. The diet is important. Alcohol and spiced food should be excluded. Milk is an excellent basis for the diet. The general health should be carefully considered. Tonics, such as arsenic and quinin, should be administered. When the patient is unable to rest, sleep should be secured by the administration of bromid of potash, ʒj–ʒij daily, or tincture of cannabis indica, gtt. xx–gtt. xxv, thrice daily. When the measures just named are insufficient to secure sleep, sulphonal or trional should be given in preference to opium. Local vaginal injections of hot water; carbolized, sublimated, or borated cotton tampons; or fomentations of lead-water and laudanum can be employed, or a saturated solution of bromid of potash may be painted over the surface several times daily. Local applications of chloroform in glycerin (1 : 8), hydrocyanic acid, two or three drops to the ounce, or a one per cent. solution of cocain may be used. A solution of carbolic acid, or a strong solution of silver nitrate, followed by cold compresses, may be employed. An ointment which contains acetate of lead, chloral, camphor, or chloroform (a dram to the ounce), combined with vaselin or menthol, solid stick of nitrate of silver, or the galvanic current are advised. In very obstinate cases the affected skin may be dissected. Tampons containing equal parts sulphurous acid and boroglycerid sometimes afford relief. Tobacco smoking has given relief when all other means have failed.

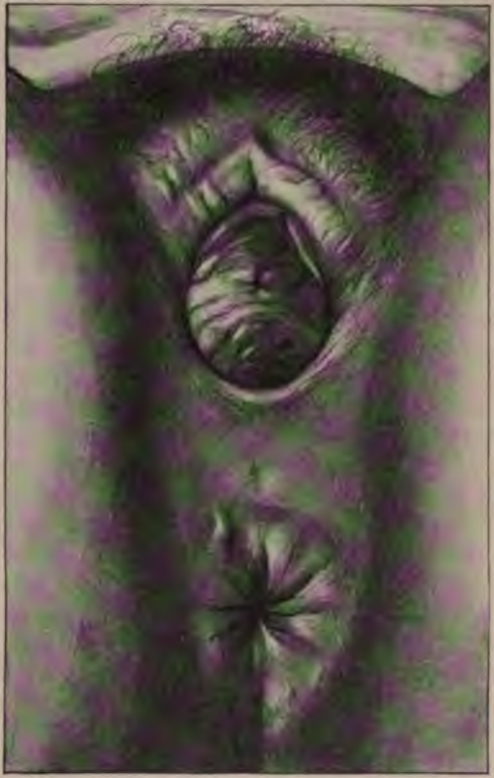

Fig. 277.—Kraurosis Vulvæ.

323. **Kraurosis vulvæ** is an obscure form of disease, first recognized by Breisky, which consists of an atrophy of the smaller labia. The skin of the vulva undergoes essential changes. The capillaries of the corium become dilated, the rete mucosum

becomes thin and disappears, while there is a substitution of a thick horny layer of epithelium, which lies directly upon the corium. The papillæ disappear, the undulating character of the skin is lost, and it becomes stiff and sclerosed, with here and there points of small cell infiltration. As the disease develops, sebaceous and sweat-glands are wanting. It is called chronic inflammatory hyperplasia of the connective tissue with inclination to cicatricial shrinking (Peter).

Causes.—The cause is unknown. It has been attributed to gonorrhea and pruritis. A preceding inflammatory stage exists (Martin). Breisky found it more frequently in the pregnant; Martin and others, in the nonpregnant.

Symptoms.—The surfaces become contracted, presenting a smooth cicatricial appearance, devoid of glands, with reddened, inflamed points, not fully cicatrized; intense itching, burning, and pain upon urination. The surface is dry, smooth, contracted, often fissured. The labia minora entirely disappear and the clitoris is a mere papule. The vulvar orifice is contracted, rendering coition exceedingly painful, often impossible. Childbirth results in extensive tears.

Diagnosis.—The scratching of this disease should be separated from that of onanism and pruritis. The gratification induced by masturbation and the absence of cicatricial changes distinguish it. In pruritis the tears and superficial injuries are more marked and the disease is not so general, while in kraurosis the border of disease is more sharply defined toward the healthy skin.

Prognosis.—Its spontaneous recovery is very doubtful. That carcinoma occasionally develops from it is exceedingly probable.

Treatment.—The disease is exceedingly intractable to treatment. The application of cocain adds to the discomfort. Relief has been afforded by applications of strong carbolic acid, or of pledgets wet with a solution of lead acetate. The thermocautery has been applied. The most effective treatment is the excision of the affected tissue, accomplishing union of the healthy tissue by sutures. Care must be exercised not to permit narrowing of the urethra.

324. Vaginismus is a term employed to represent an abnormal hyperesthesia of the external genital organs which produces muscular spasm. It is common in young, nervous, or hysteric women, and occasionally occurs without our being able to discover any source of irritation. Usually, we find associated an irritable spot in the fossa navicularis; an inflamed and thickened hymen, which has failed to rupture, or when it has ruptured, irritable carunculæ myrtiformes; fissures in the fourchet or around the orifice of the vagina; small ulcerations within the hymen; fissure of the anus;

urethral caruncle, or an irritable urethra. Nervous irritation of the vulva may be engendered by association with an impotent or partly impotent man.

Symptoms.—Dyspareunia, or painful coition, and sterility are the most marked symptoms. The slightest touch, or even the approach of the male, may cause powerful spasm. The suffering may be so intense as to lead the patient at once to seek medical advice, or through a sense of delicacy she may be led to endure the distress until it becomes intolerable. She becomes careworn, anxious, and even hysteric. The ordinary vaginal examination is extremely painful. Before attempting digital examination it is well carefully to inspect the surfaces, and to push the labia apart, when we possibly discover its cause. Hildebrandt has described a form of vaginismus due to spasm of the levator ani muscles, known as superior vaginismus, which is responsible for that unpleasant complication, penis captivus. It must not be overlooked that dyspareunia may be occasioned by pathologic lesions of the floor of the pelvis, such as prolapsed, inflamed ovaries and tubes, inflammation of the cervix, pelvic cellulitis, or peritonitis.

Prognosis as to cure is good.

Treatment.—The first aim in treatment should be the removal of the cause. It may be necessary to clip away the entire hymen, when the mucous surfaces should be sutured in order to preclude the formation of cicatricial tissue. In irritable fissure the base should be divided, as in fissure of the anus, or touched with the thermocautery. Local applications are often effective, of which one of the best is iodoform in powder or ointment. Its disagreeable odor, which often precludes its use, may be overcome by rubbing up a few drops of oil of eucalyptus with each ounce of the powder. Pledgets of cotton soaked in a four per cent. solution of chloral or in a two per cent. solution of carbolic acid are useful. Ointments of opium, belladonna, or ichthyol often afford relief. Neuromata, irritable carunculæ myrtiformes, and urethral carunculæ should be snipped off. In fissure of the neck of the bladder the urethra should be overstretched and cocain filaments or pencils should be used. In obstinate spasm (see Fig. 14[illegible]) glass dilators or plugs should be worn for an hour night and morning. The pain caused by the introduction of the plug soon ceases, and can be decreased by anointing it with a medicated ointment. These instruments should gradually be increased in size. When the dilator can not be worn, recourse should be had to operation.

Sims divided the superficial fibers of the sphincter vaginæ—the bulbocavernosus muscle. With the patient anesthetized, two fingers of the left hand are passed into the vagina to stretch the ostium. An incision about two inches long is made on each side of the fourchet, extending from half an inch above the ostium to the raphe of the perineum. The ostium is thoroughly plugged with gauze, which is kept in position by a T-bandage. This plugging is important to prevent hemorrhage. The gauze is removed the following day, after which the glass plug should be worn a portion of each day for several weeks.

For incision forcible stretching may be substituted. This is accomplished by introducing the thumbs (Tilt) or several fingers of each hand (Hegar) and forcibly separating them until the muscular fibers yield under the traction. This procedure affords the advantage that it is bloodless and that it leaves no granulating wound, to cause a cicatrix. The galvanic current has proved beneficial. Constitutional treatment always should be combined with the local measures. Quinin, arsenic, and strychnin should be given. Outdoor exercise and change of scene should be encouraged and complete sexual rest enjoined.

325. **Urethritis.**—Inflammation of the urethra is an exceedingly painful, but not an unusual, complication of pelvic abdominal procedures in which the catheter has been employed.

Varieties.—It may be manifest as a simple hyperemia, an acute catarrhal urethritis, a chronic interstitial urethritis, or a granular or follicular urethritis. Associated with the urethral inflammation occasionally occur ulceration, fissures, and a sacculated condition of the urethra.

326. **Hyperemia** may result from injury during a difficult labor; from uterine displacement and uterine growths affecting the pelvic circulation; from varicose veins, irregular urination, excessive coitus, or long-continued irritation. Probably the most frequent cause of hyperemia which may go on to inflammation is the repeated use of the catheter. So probable is such a result that the majority of operators prefer, if possible, to have the patient evacuate the urine unaided. When its use is necessary, it is advisable for the operator to have the nurse introduce the instrument for the first time in his presence, so that he can observe what precautions she practises and determine the ease with which she can accomplish the procedure. The instrument should never be introduced by touch, but always by sight. The vulva and the vestibule are generally covered with discharge, which may have decomposed and become possessed by micro-organisms capable of producing serious discomfort when carried into the bladder.

The labia minora should be separated and the vestibule sponged with absorbent cotton saturated with an antiseptic solution. The instrument, preferably of glass, should be perfectly smooth, with no rough or cutting edges. It should be boiled, kept in an antiseptic solution, and previous to its use should be washed with sterile water. It is then anointed with carbolized vaselin and carried by gentle pressure upward and backward, without exercising any force. If the instrument apparently catches, withdraw and reintroduce it, as it may have entered one of Skene's follicles.

Even with the exercise of every precaution the urethra is often so irritated by the frequent introduction of the catheter that the patient may suffer more distress than from the condition for which the operation was performed; consequently whenever the patient can evacuate the bladder unaided, she should be encouraged to continue it, as the contact of healthy urine with a plastic wound, if the precaution is observed immediately to irrigate it, is less harmful than would be the frequent introduction of the catheter.

In operations upon the bladder requiring the urine to be frequently evacuated, a self-retaining catheter should be left in place several days. The soft rubber instrument with a flange upon its vesical end its serviceable. It can be plugged, permitting the urine to collect for two or three hours. It should not be permitted to remain longer than forty-eight hours without removal and careful cleansing.

327. Acute Catarrhal Urethritis.—The mucous membrane becomes thickened; its papillæ are hypertrophied and are covered with an imperfectly developed epithelium. At points the latter is desquamated and the papillæ are enlarged, which may result in the formation of a considerable sized mass, which projects from the surface frequently by a pedicle—the urethral caruncle.

The acute disease can arise from long-continued and repeated hyperemia or from traumatism, but most frequently from gonorrheal infection. The urethra is often the first point affected.

Symptoms.—The onset of the acute attack is at first made known by itching or smarting of the urethral orifice; then the urine begins to scald, followed by frequent desire to urinate. The meatus becomes red, swollen, then dark red and pouting. It is tender to the touch, and pressure along the urethra causes a few drops of mucopurulent or purulent secretion to be discharged. If the disease does not extend to the bladder, the symptoms soon subside or disappear.

Diagnosis.—The condition should not be confounded with cystitis. The tenesmus of urethritis can be controlled; it is attended with scalding, but is relieved by urination. In cystitis the tenesmus is uncontrollable, unrelieved by urination, and there is no urethral burning.

328. Chronic catarrhal urethritis is very generally an interstitial inflammation. The membrane is thickened and the canal is narrowed, not infrequently permanently so, resulting in a stricture.

Symptoms.—Urination is frequent. Temporary retention may result from spasmodic stricture. The latter is greatly aggravated by frequent coition or prolonged exercise. The thickening of the urethra is apparent upon passing the finger down the anterior wall of the vagina along its course. A small sound can be passed through the urethra, while the introduction of a large one meets with resistance and produces severe pain.

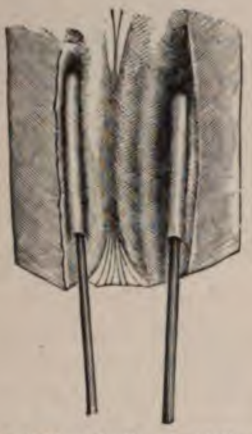

Fig. 278.—Urethra Laid Open with Probes, Distending Skene's Glands. Posterior Wall Divided.—(*Byford, after Skene.*)

329. Follicular inflammation involves the follicles about the orifice of the urethra and Skene's glands. The latter are two tubules which will admit a No. 1 probe (French scale), and are situated in the floor of the female urethra, extending upward from the meatus about one or two centimeters. In the normal condition the orifices of the tubules are three millimeters within the meatus, but with the urethra slightly prolapsed and the meatus everted, the orifices may be exposed to view. The upper ends of these canals terminate in a number of divisions, which project into the muscular wall of the urethra. These tubules occasionally become so distended as to permit the introduction of a small catheter. If such an instrument were forcibly introduced, it would tear through the tubule and establish a false passage. Such a passage might enter the urethra or pass beneath it into the tissue and thus enter the bladder. The follicles and tubules about the urethral orifice may become inflamed, with discharge of mucus and pus. The mucous membrane may become thickened or the orifices closed. The latter will result in the formation of a small cyst.

Symptoms.—The symptoms are great tenderness; discomfort in sitting, standing, or walking; dyspareunia; stinging pain; a sensation of heat; and frequent and painful micturition. The orifice of the meatus is partly everted, with red, puffy folds, which simulate caruncle, and with erosion of the labia minora and of the edge of the meatus. A few drops of discharge can be extruded by pressure along the urethra.

330. **Ulceration** is produced as a result of traumatism, from calculi, unskilful use of the catheter, specific infection, or the presence of the diphtheric or the venereal poison.

During the passage of a calculus, or while in labor, injury, laceration, or overdistention of the middle portion of the canal occurs, with contraction of the meatus. A small portion of urine and mucus is retained, which decomposes, and results in the development of inflammation and in the production of a condition simulating an abscess.

Symptoms.—The most prominent symptom is dysuria, which becomes chronic. The meatus is large, of a deep red, granular appearance, and sensitive to pressure. The passage of an ordinary sound is readily accomplished, but is attended with pain. Sometimes there is a drop of blood discharged. The sacculated form is associated with a large discharge of pus, particularly when pressure is made along the urethra. Even when the discharge of urine is perfectly clear, pressure will cause a considerable discharge of pus.

331. **Vesico-urethral fissure** holds an intermediary position between cystitis and urethritis, and strikingly resembles both. Its cause is undetermined. It is situated at the internal meatus, resembling a crack in the lip or an ulcer similar to that which is found in fissure of the anus. The fissure is usually spoken of as being situated in the neck, but, as a rule, two-thirds of it is in the urethra. Only the upper end of it extends into the bladder. It may occur at part of the circumference of the urethra, but, according to Skene, it is, in the majority of cases, situated upon the right side. In length it is from six millimeters to one centimeter, and is from two millimeters to four millimeters in width at the widest part. It is deeper at either end. The deepest portion, yellowish-gray in color, resembles an indolent ulcer, while its edges are red and inflamed. Through an endoscope it looks like a fresh tear, the edges of which are abrupt, elevated, and indurated. Its situation explains the attendant discomfort. In any other portion of the urethra it produces little inconvenience beyond a smarting sensation, but at the junction of the bladder and urethra it is subject to constant though slight pressure, which causes severe and continuous pain. The portion of the fissure extending into the bladder is exposed to irritation from contact with the urine, producing a constant desire to urinate, a sensation of burning at the neck of the bladder, acute pain during and immediately following micturition, and severe tenesmus, causing

the patient to continue straining efforts after emptying the bladder. The pain and burning immediately following micturition are often intense. Subsequently, it partly subsides, to return with the accumulation of a small quantity of urine. If the patient resists the inclination to urinate, the distress is greatly aggravated.

332. **Diagnosis.**—The determination of inflammation of the urethra is often difficult, because it is frequently complicated by inflammation of the bladder. Acute catarrhal inflammation of nonspecific origin usually begins gradually, and is often preceded by uterine or vesical symptoms, while the gonorrheal variety appears abruptly, and is preceded or attended by acute vaginitis or vulvitis.

In both varieties urination is painful. Sharp scalding is produced by urine passing over the inflamed surface, but the desire to urinate is not so frequent or urgent as in cystitis. Often the urine is long retained, for fear of the pain occasioned by its evacuation.

Slight hemorrhage is occasionally noticed, the urethral origin of which is evident from its being unmixed with urine, a few drops oozing from the external meatus subsequent to urination. Urethral discharge is common, and, except just after urination, it can be extruded from the orifice by pressing upon the urethra from the vagina. Microscopic examination of the discharge may reveal the presence of gonococci, which determines the nature of the urethritis. Absence of this germ, however, is not proof positive against the gonorrheal origin. To exclude cystitis, introduce the catheter, allow some urine to escape to wash away the mucus carried in with the instrument, and retain the remainder, which will be found free from sediment. Pressure along the urethra from the vagina is painful in urethritis, while pressure over the bladder, unless complicated by cystitis, is not uncomfortable.

In chronic urethritis the urethra is less sensitive, but is noticeably thickened when examined from the vagina.

In *granular erosion* the pain during micturition is excruciating, keeps up a tenesmus, and is more likely to be found in old persons.

The character of the disease is assured by its history and by the appearance of the urethra. Fissure, urethritis, and cystitis are distinguished, the latter especially by examination of the urine. Fissure alone is free from all the products of cystitis. Urethritis is excluded and the fissure detected by the use of the endoscope. The endoscope is more satisfactory than the ordinary open instrument because it exposes the surface of the fissure, which would be overlooked by the open end instrument. As a rule, the pain in fissure is more circumscribed than in either urethritis or cystitis, and in many cases more acute.

The maximum of pain in fissure follows urination, while in cystitis there is a sense of relief. In urethritis the most severe pain occurs during the act of urination. It then subsides slowly.

333. **Treatment.**—In urethral hyperemia render the urine alkaline and unirritating by the exclusion of acids and stimulants from the diet and by the administration of saline cathartics. Relief is enhanced by giving ten grains of benzoate of ammonia every three or four hours, and by the employment of hot hip-baths and hot vaginal douches.

Acute urethritis, whether specific or otherwise, should be treated upon the same principles as in gonorrhea of the male. Treatment consists of constitutional and local measures. Internally, salicylic acid in ten-grain doses lessens the discharge. Douche the urethra frequently with hot water through a reflex catheter, so that the current flows back from a cap on the end of the instrument. Later, inject from one-half of one to one per cent. of carbolized water; sublimate, gr. $\frac{1}{40}$, to aq., f℥j; silver nitrate, gr. $\frac{1}{6}$, to aq., f℥j; or zinc chlorid, gr. x, to aq., f℥j; preceded, when injection is painful, by the instillation of a solution of cocain with a pipet.

In making urethral applications it should not be forgotten that the canal will hold but from ten to fifteen drops. If a larger quantity is thrown in by the pipet, it flows into the bladder. A strong solution of silver nitrate (gr. x–xv to aq. f℥j) may be applied by pipet or applicator.

Internally may be administered remedies which will have an inhibitory influence through the urine. These so-called blennorrhagic remedies are copaiba, cubebs, and sandal-wood oil.

The itching of subacute and chronic urethritis may be alleviated by applications of different combinations of chloral or hydrocyanic acid, as in the following prescriptions:

℞. Chloral, ... ℈iv
Lanolin, ... ℥j. M.
Ft. ungt.

℞. Chloral,
Camphor, ... āā gr. xxx
Lanolin, ... ℥j. M.
Ft. ungt.

℞. Acid. hydrocyan. dil., ... ʒj
Plumbi acet., ... gr. xv
Glycerin, ... f℥j.

These remedies may be brought in contact with the affected surface by the applicator. A suppository or bacillus of cocain in cacao-butter, or in combination with lead acetate, will give relief. These bacilli should be introduced into the urethra, preferably after urinating, two or three times in the twenty-four hours. In long-continued disease that has resulted in thickened walls and a more or less contracted canal the dilatation of the urethra by bougies once or twice weekly will be beneficial.

The bougie may be anointed for introduction with mercuric oleate, the official ointment of mercury, or any other medicinal agent which will have a beneficial influence upon the mucous surface. M. Julien, Paris, applies ichthyol by dipping into it a cotton-wrapped probe, which is passed and repassed into the urethra several times. This agent has a destructive influence upon the gonococcus.

In granular erosion pure carbolic acid may be brushed over the surface, and repeated in eight or ten days, or silver nitrate (gr. xv to aq., f℥j). The urethra should be previously dilated. Following the subsidence of the acute symptoms, a few drops of a solution of zinc sulphate, gr. iv, fluid extract of hydrastis canadensis, f℥j, aq., f℥iij, may be used twice weekly with a pipet.

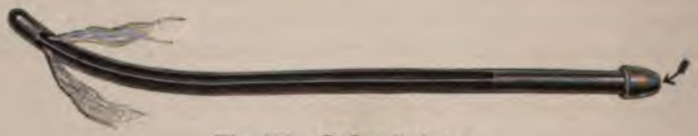

Fig. 279.—Reflex Catheter.

In fissure, instillations and injections do harm, by increasing the spasmodic contraction of the bladder, and they increase the distress of the patient.

A fissure may be exposed by a fenestrated speculum, and dusted with calomel, finely pulverized iodoform, or bismuth subnitrate, or the mitigated stick of silver nitrate may be employed. Incision of the fissure as performed in anal fissure is successful. The urethra should have been previously dilated. Dilatation is one of the most effective methods of treating fissure. The precaution must be exercised not to overdilate the urethra and thus produce permanent incontinence.

Follicular urethritis is most effectively treated by splitting up the tubes their entire length. This may be done with the thermocautery, or they may be cauterized with carbolic acid and subsequently treated with milder agents, as in urethritis. In such cases, however, splitting up the canal is a prerequisite to cure.

334. **Cystitis** is inflammation of the mucous membrane of the bladder, and may be either *acute* or *chronic*.

Etiology.—The bladder is in intimate muscular relation with the uterus, as well as dependent upon the same nerve-centers and ganglia for its nervous distribution. A portion of the bladder lies in direct contact with the cervix, but in more intimate relation with the vagina. It is not surprising, then, with such intimate relations, that the condition of the bladder should be affected by disorders of the uterus.

Inflammatory conditions of the bladder, if not excited by disorders of the uterus, are aggravated thereby. Cystitis is affected during menstruation and aggravated by metritis. Vesical symptoms are engendered by uterine and vaginal displacements, by subinvolution and hypertrophy, by tumors and pregnancy. The train of phenomena thus engendered may be enumerated as: difficulty in evacuation; retention and decomposition of the urine, producing irritation, and finally cystitis. Cystitis may be secondary to inflammation of the kidneys, ureters, or urethra. Chemic modifications of the urine may result from indiscretions in diet, from the administration of irritating drugs, or from affections of the central nervous system. Inflammation is produced by traumatisms, injuries from the introduction of a catheter, or the presence within the bladder of a rough calculus.

The most frequent cause of cystitis, without doubt, is infection. Other causes are the entrance of bacteria from an abscess through the blood, the extension of inflammation from neighboring organs, or the passage of the infection by the urethra.

Microbes are generally introduced into the bladder through the use of the catheter. A violent form of cystitis is produced by retention. Pregnancy of a retroflexed uterus, which becomes impacted in the pelvis by pressure upon the neck of the bladder, not infrequently leads to gangrene and desquamation, or to shedding of the entire vesical mucous membrane.

Pathologic Changes.—The mucous membrane becomes injected, particularly about the orifices of the ureters and internal meatus. As the inflammation progresses, the entire mucous membrane is swollen and becomes a bright red. The epithelium is desquamated and patches of ulceration or hypertrophied papillæ appear, which bleed easily. Abscesses develop in the vesical wall. The micro-organism most frequently found is the bacillus coli communis. Disease is also induced by the staphylococcus, the gonococcus, and the bacillus tuberculosis.

335. **Symptoms of Acute Cystitis.**—Acute inflammation of the bladder is characterized by painful micturition; frequent desire to void urine, with only a few drops discharged at each attempt;

severe vesical, and frequently rectal, tenesmus; a sensation of fullness or weight in the hypogastrium; shooting pains in the perineum and anus; and a burning, lancinating pain, like a hot iron, in the urethra. These attacks may be almost continuous, or may, after a time, subside, to recur again in an hour or so. The touch, whether over the abdomen or by the vagina or rectum, is extremely painful. The urine is scanty, highly colored, and becomes cloudy after standing. In very severe attacks the urine becomes a dark red color and contains blood and pus-corpuscles and uric acid crystals.

Constitutional disturbances are marked. These are nervous excitement, insomnia, and anorexia, followed by emaciation and loss of strength. Uncomplicated vesical inflammation does not cause elevation of temperature (Guyon). Partial or complete retention of urine is frequent. Paroxysmal pain results from vesical distention, and there may be frequent evacuation or continuous dribbling of urine without at any time emptying the bladder—an evidence of overflow known as the incontinence of retention. The course and duration of the disease are variable; it may subside in a few days or may continue alternately better or worse for weeks.

336. **Symptoms of Chronic Cystitis.**—In chronic inflammation the symptoms are less pronounced, though similar to those of the acute disease. Micturition is frequent and painful, often difficult. The pain is pronounced at the beginning of the evacuation, thus leading to delay in starting. Exposure to cold, dampness, changes of clothing, indiscretions in diet, or constipation, lead to acute or subacute attacks. The urine, after standing, becomes cloudy, and contains blood and pus-corpuscles, mucus, and uric acid crystals. If drawn with the catheter, it is at first clear, then turbid, and toward the last pus is apparently discharged. The microscope reveals leukocytes, epithelial cells, tissue debris, and salt crystals. When the urine stands, it becomes alkaline, and bacteria are found.

Constitutional Condition.—The patient is easily fatigued, has no appetite, loses flesh, develops a cachexia, has repeated inflammatory attacks associated with fever, repeated chills, a more or less continuous diarrhea, profuse sweating, and, finally, a fatal termination. Such a train of symptoms and such a termination indicate the presence of an infectious pyelonephritis as a complication.

337. **Diagnosis.**—The determination of cystitis is not difficult. The frequent micturition, pain, alkaline reaction of the urine, and mucopus are sufficient. In *cystalgia* and functional diseases of the bladder the urine is clear. In pyelonephritis, if we irrigate

the bladder and use the catheter, the urine will still be altered, while in cystitis it will be clear. Ureteral catheterization will afford information as to the relative condition of the two kidneys.

It is of great value not only to recognize the disease, but to secure accurate information as to its cause and variety.

338. **Cystitis of gonorrheal origin** is produced by the entrance of gonorrheal infection through the urethra, possibly the careless use of the catheter, but more frequently from the extension of urethritis to the bladder. Its principal symptoms are frequent micturition, agonizing pain in the acute stages, and associated with changes in the quality of the urine; hematuria is a constant symptom, but is rarely profuse. These symptoms do not occur in the early stage of the infection. The disease is generally much milder, characterized only by tenesmus. In the mucopus of the urine, from the associated urethritis, the gonococcus may be found.

339. **Tubercular cystitis** presents symptoms very similar to those produced by inflammation from gonorrhea and the irritation of calculi. Hematuria is a symptom in all varieties, but differs in tuberculosis. The symptom appears early in the disease, and the blood is generally mixed with the last drops of urine. The bleeding ceases as the disease advances. In common with other vesical inflammations, pain, urethral spasm, and retention and incontinence of urine are marked. The diagnosis is definitely determined by discovering Koch's bacillus, but the latter is not always found. In examination over the bladder more pain is occasioned by suddenly withdrawing the hand pressure than by deep palpation. The extent of the ravages of the disease can be appreciated by the cystoscopic exploration of the bladder through the urethra. Neoplasms are differentiated from cystitis by the early appearance of hematuria, with absence of pain, tenesmus, or frequent micturition. The quantity of blood increases near the close of micturition, and may continue for days and weeks, or may suddenly cease; occasionally, fragments of the diseased structure are discharged. Pain is a late symptom. The character of the condition is determined by a cystoscopic inspection of the bladder cavity. Gonorrheal cystitis may last from three days to two or three weeks, without apparent cessation, and upon it the tubercular variety may supervene.

Primary tuberculosis results in a very irritable bladder, with frequent and painful micturition, followed by a few drops of blood. These symptoms may subside, to be followed by an aggravated attack. The presence of pus indicates preexisting disease, which may have been unsuspected. The course of the disease is more rapid when complicated by the discharge of pus, the presence of a fistula, or the symptoms of pyelonephritis.

Hematuria, if dependent upon tumors, varies with their character. If the tumor is benign, the progress of the disease is slow, unless it affects a ureter or the pelvis of the kidney.

Membranous cystitis is a special form of inflammation, characterized by exfoliation of the bladder-wall, as in pseudomembranous, gangrenous, croupous, or diphtheric inflammation. It is always a secondary condition, produced by overdistention of the bladder or by retention of urine.

The mucous membrane becomes anemic, and, subsequent to the removal of the bladder-contents, acutely congested or engorged with blood. Any cause which obstructs the urethra will produce it. The most frequent causes are incarceration of a retroflexed gravid uterus, unilateral hematometra, fibroid or ovarian tumors deeply situated in the pelvis, and loss of muscle power in low fevers or in septic conditions.

The nurse or attendant may be misled by incontinence, a small quantity of urine being continually passed, but the bladder is more and more distended. The enlargement is gradual, extending above the navel, forming a tumor, which may very readily be mistaken for an ovarian cyst. Finally, the distention reaches its maximum, when the reservoir can contain no more, and the abdominal pressure produces an involuntary discharge, an overflow, a condition known as the incontinence of retention. The bladder is not completely emptied. The symptoms—pain, involuntary evacuation of urine, a suddenly formed, gradually increasing tumor, percussion, dullness over its site, absence of uterus above the symphysis, and projection of the anterior vaginal wall backward—should leave no doubt as to the diagnosis. Repeated attempts to catheterize such a patient by an ignorant midwife may result in the formation of a false passage, or neglect to cleanse the vulva will often afford entrance for sepsis into the bladder. The conditions are favorably disposed for the development of sepsis.

With retention of urine, hyperemia, infection, and traumatism, would it not be surprising if cystitis did not exist? The enormous quantity of urine in the distended bladder, by pressure causes anemia, which results in disturbance of nutrition and superficial necrosis; a deeper necrosis may be caused by bacterial changes, as indicated by ammoniacal urine, or the compression from overdistention may produce ischemic necrosis. All these processes favor destruction of the mucous membrane. The entire inner wall of the bladder may be loosened, covered with the phosphates of ammonium and magnesium, and penetrated with putrid bacteria. Horny concretions are found in the membrane. The surface of the membrane is black or gray, and contains numerous extravasations. It may come away in pieces or as a sac, a complete cast of the bladder.

The membrane, or a piece of it, may lie over the urethral orifice, completely obstructing the evacuation of urine. The introduction of the catheter may be rewarded by the discharge of a small quantity of pus which has accumulated below the membrane, while an energetic push upon the catheter penetrates the membrane and a large quantity of foul, stinking urine is evacuated. Violent tenesmus is a frequent symptom. After dilatation of the urethra the membrane can be drawn through it in a black mass.

With the removal of the gangrenous mass the bladder should be irrigated with a boric acid solution (4 : 100) or a formalin solution (1 : 5000). A graduated irrigator is preferably employed, and not more than three or four ounces should be injected at one time. This may be pressed out and the fluid again allowed to flow in, repeating this twenty times. The irrigation should be performed four times daily. It is surprising in these cases of extensive septic inflammation to recognize the subsequent power to retain urine.

Cases have been reported in which an extra cast of the bladder has been exfoliated and the organ almost entirely regained the former power of performing its functions.

Foreign Bodies.—Cystitis arising from the presence of foreign bodies, such as calculi, is characterized by severe pain upon motion, frequent micturition, violent expulsive efforts, and hematuria upon active exercise, from carriage jolting, or from fatigue.

Inflammation may arise from the administration of certain drugs and balsams; from the application of vesicants, especially cantharides, when micturition will be frequent and painful and tenesmus very marked.

The prognosis is doubtful, and largely depends upon the carefulness of the treatment.

340. Treatment.—In the treatment of inflammation of the bladder, the aim should be, first, to remove or lessen its cause; second, to afford relief to pain; third, to improve the general condition of the patient.

Prophylaxis.—The first indication is met most completely by prophylaxis, which, in all conditions dependent upon microbic invasion, should be the first consideration. Disinfection of the body, of the surroundings, of the hands, and of the instruments is necessary. The old procedure of introducing the catheter by touch is reprehensible. In the puerperal woman artificial light may be necessary. The legs should be flexed strongly, the better to bring the vulva into view. A small vessel is placed between the limbs, or the patient may be placed upon a bed-pan and a warm disinfectant fluid poured over the vulva, which may enable her to void the urine spontaneously. If unsuccessful, the vulva is sponged with a cotton tampon and an irrigation stream is directed upon the urethral orifice. Then the catheter is taken from a disinfecting fluid and carefully introduced, to avoid pain. Occasionally, there is resistance at the internal end of the urethra, which is not overcome without pain. Care should be exercised in the withdrawal of the instrument, as the mùcous membrane may be sucked into the eyelet of the catheter. Pushing up the instrument before its withdrawal will loosen it, when it can be removed without vesical injury. Whenever possible, the use of the catheter should be avoided, as, notwithstanding all precautions, the mucous membrane of the urethra will be irritated by its frequent introduction, thus affording an opportunity for infection.

Medical treatment to a limited degree meets all the indications we have assigned for the treatment of cystitis. The acidity and tendency of the urine toward decomposition is combated by the use of diuretics, and by the administration of large quantities of the alkaline waters, such as Saratoga, Vichy, Seawright, Buffalo or Londonderry lithia, Carlsbad, or Seltzer. The salicylates are more efficacious than all other remedies: salol, gr. ij–iij every three or four hours; strontii salicylate, gr. iij–v four times daily. These agents prevent decomposition, remove the odor, and decrease the pain and tenesmus. They should not be given on an empty stomach. The diet, though nutritious, should exclude stimulants, acids, and condiments, except salt. Sugars and starches should be sparingly used, and in acute and severe cases it is well to restrict the patient to skimmed milk. In acute cases the patient should be confined to bed, and all exposure to dampness or cold should be avoided. In all cases care should be exercised regarding suitable clothing and protection against exposure. Pain may be so marked and micturition so frequent that measures must be instituted for its relief. Morphin or opium affords relief, but the pain soon returns. The remedy can not be repeated every two or three hours without danger of establishing the habit. An ice-bag over the bladder will frequently give comfort; in other cases the hot-water bag is better borne.

In the more distressing cases opium may be given in combination with belladonna or stramonium; deodorized tincture of opium and tincture of belladonna, 10 to 15 drops of each every two or three hours until relief; or suppositories of extract of opium, $\frac{1}{4}$–$\frac{1}{2}$ of a grain, and extract of belladonna, $\frac{1}{8}$–$\frac{1}{4}$ of a grain, in cacao-butter—two, three, or four of these suppositories daily, according to the degree of pain. Relief is most quickly secured by a hypodermic injection of $\frac{1}{8}$ of a grain of morphin. When opium is badly borne, cocain hydrochlorate, $\frac{1}{6}$ of a grain, may be given by suppositories in combination with the same quantity of extract of hyoscyamus. When the pain is limited to the urethra, it may be subdued by injecting a solution of cocain by a syringe with a bulb nozle. The openings about the bulb should be so situated as to direct the current back toward the external orifice. A celluloid is preferable to a metal syringe, because it can be used for sublimate and silver nitrate solutions.

Inflammation of the neck of the bladder may be alleviated by the introduction night and morning of a vaginal tampon covered with an ointment containing 30 grains of extract of belladonna to 1 ounce of camphorated lanolin.

Calculi and foreign bodies should be removed and shreds of membrane and casts of the bladder should be early separated and evacuated.

Gonorrheal and acute cystitis are considered as requiring diuretics, such as the alkaline salts, alone or in combination with oil of birch, buchu, or triticum repens. The following prescription is often serviceable :

℞. Ammon. benzoat., ... ʒ iij
Tr. hyoscyami, ... f℥ j–ij
Ext. buchu *vel* tritici repens, ... ad f℥ ij. M.
SIG.—A teaspoonful in an ounce of water four times daily.

Marsh directs :

℞ Acid. oxalic., ... gr. xvj
Syr. aurant. cort., ... f℥ j
Aq. pluv., ... ad f℥ iv. M.
SIG.—A teaspoonful every four hours.

The bromid salts are often of value.

Free evacuation of the bowels by salines should be secured. After the severe distress and pain have subsided in acute cases and in all chronic inflammations, advantage may be secured by intravesical medication.

The bladder is irrigated through a return-current catheter by means of a fountain syringe : the fluid may be permitted to flow in until the discomfort is marked, when the tube is pinched and the fluid evacuated. In the absence of a double catheter, a single instrument may be used ; the bladder is filled and the fluid is allowed to flow out, and the process is repeated until the bladder has been filled and emptied a number of times. This troduced through the speculum. It is then inflated by a bulb syringe, the number of bulb pressures required to fill it having been previously determined. The balloon remains *in situ* twenty minutes.

Guyon, in bad cases, advises that the bladder should be irrigated under anesthesia with a solution of boric acid (1 : 10,000) or sublimate, and cureted with a medium-sized curet. The finger in the vagina as a guide enables him to go over the base and sides, while the hand over the abdomen aids in reaching the anterior surface; lastly, the urethra is scraped, the irrigation is repeated, and a self-retaining catheter is introduced and retained some fifteen or twenty days.

Camero reports twenty-nine cases thus treated, in which nineteen were successful. In serious tubercular cases in which pain and tenesmus are very marked *cystotomy* may be employed. It places the bladder absolutely at rest. A sound or bougie is passed through the urethra and used to depress the anterior vaginal wall while an incision is made through the septum. The vaginal and vesical surfaces are united by sutures to prevent the opening from closing. This procedure deprives the patient of control of the bladder contents, and requires the provision of an apparatus or receptacle for the urine.

341. **Ureteritis** is inflammation of the ureter, and may be acute or chronic. It generally begins in the mucous membrane, extending through the wall of the canal, so that the ureter presents the palpable sensation of a thick, rigid cord.

Causes.—The disease, according to Mann, is produced by a number of causes: first, injuries during parturition; second, from previous disease of the bladder; third, gonorrhea; fourth, suppuration in the pelvis of the kidney; fifth, pelvic disease, such as pelvic peritonitis, cellulitis, and tumors; sixth, abnormal conditions of the urine; seventh, tuberculosis, to which may be added an eighth—the passage of calculi.

342. **Acute ureteritis** is often mistaken for intestinal colic, pain from renal strain, catarrhal appendicitis, or acute catarrhal salpingitis. The patient has a sudden attack of abdominal pain in which the distress is limited to, or more pronounced upon, one side, or but slight upon the other. The pain is intermittent, with not infrequently severe paroxysms. General abdominal tenderness is probably absent, while there is noticeable tenderness upon deep palpation upon the affected side, which in the beginning is more marked near the pelvis of the kidney. The site of most marked tenderness may be situated at McBurney's point. As the inflammation subsides the pain disappears, and may be recognized at a point an inch above Poupart's ligament. Originating in the

back, it can not be differentiated in the early stage from colic occasioned by renal strain. When complicated by intestinal disorder, it may be recognized by its characteristic progress from above downward, the appearance of vesico-ureteral tenderness, and the urinary disturbance. The condition may terminate in recovery or may result in the chronic form.

343. **Chronic ureteritis** is characterized by frequent desire to urinate, which is more marked while erect, especially when standing, and is not wholly relieved by the recumbent position. The patient is obliged to arise from one to many times a night; the discharge may or may not be painful. Frequently, the desire to evacuate the urine will be imperative, and the urine will gush forth before she can secure privacy. In some cases she complains of bearing down, greatly increased by standing, which disappears after a few hours' rest in bed. Palpation may afford no sign, except a slightly thickened cord, or a rigid mass almost the size of the finger, pressure along which will cause a discharge of urine with such power as to drive it some distance from the urethral orifice. The necessity for a cystoscopic examination of the bladder will depend upon the severity of the attack; when attended with much pain, it should be made. An alteration of the vesical mucous membrane in and about the orifice of the ureter will be recognized.

This alteration may vary from a slight eversion and gaping of the orifice to one in which the orifice is an oval opening upon the summit of a mound of angry looking mucous membrane. The mucous membrane in the immediate vicinity may be normal, but is generally red and injected, even roughened and eroded.

The urea is said to be decreased upon the affected side.

The urine may be secured for examination by catheterizing the ureters or by the introduction of the Harris double catheter.

Treatment.—General treatment consists in the careful regulation of the diet, from which should be excluded strawberries, asparagus, and stimulants; tomatoes, onions, and cabbage should be used sparingly and with caution. The food should be largely albuminous, of which skimmed milk may often with advantage form its base. Large quantities of water, alkaline diuretics, or the alkaline waters are useful. In acute and subacute conditions the patient is best in bed. The nutrition should be maintained by general massage.

Local applications are advantageously made to the inflamed orifice of the ureter and to the eroded surface about it. A solution of silver nitrate (gr. x–xxx to f℥j) produces good results. It should be applied through a speculum directly to the affected surface, after which the bladder should be irrigated with a normal salt solution.

When the inflammation of the canal is extensive, the disease may be treated by irrigation through a ureteral catheter.

In tuberculous disease, which is generally secondary to disease of the kidney, the affected kidney (the other having been demonstrated to be healthy) should be extirpated, and with it the ureter.

344. **Vaginitis, colpitis,** or **elytritis,** is an inflammation of the mucous membrane of the vagina. The mucous membrane of the vagina closely resembles the structure of the skin, having few, if any, submucous glands. It consists of connective tissue surmounted by papillæ covered with several layers of squamous epithelium. A longitudinal ridge is formed upon the anterior wall, from which rugæ, or folds, like the teeth of a comb, extend upon each side. This formation is less distinct upon the posterior wall. The central projections are known as the anterior and posterior columns. The former generally terminate below, in a rounded protuberance, called the vaginal tubercle, situated immediately above the meatus urinarius. Sometimes the anterior column is divided by a furrow into two portions. The rugæ aid in promoting sexual excitement, and probably contribute to vaginal enlargement during pregnancy. They disappear toward the upper part of the canal. The vagina receives its vascular supply through the vaginal, uterine, internal pudic, and vesical arteries—branches of the anterior division of the internal iliac. The vagina is surrounded by a venous network or plexus, which communicates with those of the vulva, bladder, rectum, uterus, and broad ligament, and finally empties into the internal iliac veins.

The lymphatics of the lower fourth communicate with the superficial lymphatic glands; those of the upper three-fourths, with the internal iliac glands.

The nerves are derived from the sympathetic, and form upon each side of the vagina a plexus which communicates with the inferior hypogastric.

The arrangement of the epithelium and the absence of glands render the vagina much less vulnerable to infection than is either the uterus or vulva.

We have already referred to the normal secretions of the genital tract. Doderlein distinguished between the physiologic and pathologic secretions of the vagina. The former is markedly acid, dependent upon the presence of a bacillus which produces lactic acid. The latter may be feebly acid, neutral, or alkaline, and contain a variety of micro-organisms—saprophytic and pathogenic. Probably fifty per cent. of pregnant women have this pathologic secretion, in which germs flourish, and from which auto-infection is possible. The demonstration of the truth of this assertion greatly simplifies the study of the processes of infection.

The vaginal discharge becomes alkaline during the menstrual period, during the puerperium, and in many cases of leukorrhea —a condition which is more favorable for the growth of micro-organisms and the infection of the genital tract. Doderlein's assertion, however, does not correspond with the results of the researches of Menge, Kronig, and Walthard.

Kronig's investigations were confined to pregnant and puerperal women, and consequently are not a proper subject for consideration under gynecology further than to note his conclusion that the distinction between the physiologic and pathologic secretions is not determinable. He asserts that all secretions alike contain *no* pathogenic germs. All secretions are equally germicidal, though the vitality of the germ differs. It takes twice the time to kill the staphylococcus that it does to destroy the streptococcus. The vagina infected with germs will become aseptic in two or three days. The cause of this bactericidal power is as yet undetermined. It is not chemic, because it occurs whether the secretion is faintly or strongly acid; it is not believed to be due to a special bacillus, although some micro-organisms are known to be antagonistic to others. If it results from leukocytes, it must be due to a property independent of their contractile power, for the action continues after their subjection to a heat which would destroy the latter. The want of oxygen in the vagina will not explain it, for the staphylococci and streptococci are anaerobic—*i. e.*, grow independent of oxygen—and yet are killed. It is not mechanical, because particles of carbon and mercury are removed much more slowly. Possibly all these factors may unite to establish germicidal action. Kronig presents a very important practical observation, which is that a solution of corrosive sublimate for irrigation destroys the germicidal action, probably by precipitation of albumin, while plain water but lessens it. A necessary inference is that prophylactic injections of corrosive sublimate are prejudicial when the secretion is normal. Menge, in his investigations upon the nonpuerperal, introduced pyogenic micro-organisms into the vagina in eight women, and found that the vagina cleansed itself from these organisms in periods varying from two and one-half hours to three days. The factors which compass this germicidal action are various forms of bacteria and their products, an acid secretion, possibly serum action, and the absence of oxygen. This activity is weak in infants, and is lessened by menstruation and by increased secretion from either the cervix or the body of the uterus, or even from the vagina. It is decreased when the vulva is patulous or the uterus prolapsed, and at the menopause.

Walthard has directed attention to the influence of change of pabulum in restoring the lost virulence of micro-organisms. He inoculated the streptococcus into the ear of a rabbit without unfavorable results, unless the ear was ligatured to lessen tissue resistance, when a vaginal streptococcus became as virulent as those found in puerperal fever. It is possible that an innocuous streptococcus may thus be restored by the tissues during the puerperium, and similarly in gynecologic operations in which there is bruising of all the tissues, as in the enucleation of fibroids.

345. **Varieties.**—Vaginitis may be divided into simple and specific (gonorrheal). The latter is exceedingly important because of its intractability and its tendency to extend. The distinction between acute and chronic is merely one of degree. Special varieties named are emphysematous, exfoliative, dysenteric, phlegmonous, diphtheric, and senile, but these are unnecessary distinctions.

The etiology and pathology have undergone some consideration in our discussion of the action of micro-organisms. Of these, the gonococcus is most important, for upon its discovery will frequently depend the diagnosis. It was discovered and described by Neisser. The recognition of its presence in the secretion is diagnostic, but its absence is not an absolute indication that the secretion is not of gonorrheal origin.

346. **Pathology.**—In simple vaginitis slight elevations of the mucous membrane occur, producing a granular surface. The granulations are produced by groups of papillæ, which are infiltrated with small cells; as a consequence, the papillæ swell up and push before them the stratified squamous epithelium. Superficial layers are shed. Later, the surface becomes more level, from thinning of the superficial covering. With the vaginitis of pregnancy not infrequently an emphysematous condition of the mucous membrane is associated. These elevations have been described as cysts containing a gaseous fluid. Ruge says the gas is situated in the cellular tissue, while Zweifel says they are vaginal glands the ducts of which have become closed. A similar condition has been observed following the climacteric. The exfoliative, dysenteric, or diphtheric vaginitis presents localized patches or an inflammation of the whole vagina. In the latter condition the mucous membrane becomes so swollen that it is with difficulty the finger can reach the cervix, which is also thickened and covered with an exudation.

Senile Vaginitis.—After the menopause the epithelial tissue is desquamated, the papillæ atrophy, and the raw surfaces cause obliteration of a large portion of the vagina. The same process can cause occlusion of the cervical canal subsequent to the menopause.

Specific Vaginitis.—The most important cause of vaginal inflammation is gonorrheal infection, which produces an intractable form of vaginitis, which may continue for months, or even for years. It may extend over the mucous membrane of the uterus to the tubes, ovaries, and peritoneum, producing endometritis, salpingitis, pyosalpinx, ovaritis, and pelvic peritonitis.

347. **Etiology.**—Vaginitis is produced by gonorrheal infection; irritating discharges from the uterus; the contents of perivaginal abscesses; the contact of urine or feces through fistulæ; vaginal injections, too hot or too cold, or containing injurious chemic agents; badly fitting pessaries; decomposing tampons; efforts to produce abortion or awkward attempts at sexual intercourse; and the exanthemata; and it may complicate typhus, smallpox, and scarlet fever. Diphtheric patches have been observed in a number of diseases, particularly in the puerperal state. Localized patches are seen in fistulæ, in carcinoma, and about badly fitting pessaries. The disease is induced by the habits of the patient. The free use of alcohol produces the granular form of the disease. The gouty or rheumatic diathesis is a predisposing cause.

348. **Symptoms.**—Vaginitis is characterized by a sensation of burning, heat, and itching in the vagina; pain in the pelvic floor, increased by exercise; frequent desire to evacuate urine, with not infrequently scalding. A profuse mucopurulent leukorrhea soon occurs. These symptoms are present in both the simple and specific varieties. In the latter the disease begins as an acute infection within from twenty-four to forty-eight hours after exposure, with itching of the urethral orifice, increased desire to urinate, a sensation of heat about the vulva, and burning and scalding upon passing urine. Generally, the tenderness and discharge are moderate; occasionally, throbbing is substituted. The distress is increased by walking, even by moving the limbs, and by the slightest touch of the finger. The urethral orifice is reddened and slightly swollen, and a drop of thick mucus or mucopus can be pressed out. After one or two days the entire urethra is exquisitely tender, and the orifice is swollen, intensely red, and bathed with abundant pus. Pus and blood can be extruded from the vagina by pressure over the urethra. The hymen, vestibule, and labia become swollen, edematous, and eroded, and are covered with infected pus and exudate. At the end of a week the acute symptoms have subsided, the discharge is abundant, and when the parts are neglected they become eczematous and cause a dis-

agreeable odor. The vulva may regain its normal appearance in two weeks, while the discharge may continue for three or four weeks, or even longer. Infection of the vaginal follicles and of the vulvovaginal glands is not infrequent. The inguinal lymphatics become swollen, and may even suppurate. In the early part of the attack the gonococci are present to the exclusion of all other forms of bacteria, but later they may entirely disappear. The disease shows a marked tendency to invade the deeper and more important organs by the continuous mucous membrane.

349. **Diagnosis.**—Upon separation of the labia a profuse discharge is noticed, covering a reddened, thickened, and roughened or granular mucous membrane. The speculum shows the vagina a red, swollen, smooth, velvety surface, from which the rugæ have disappeared; or the redness, as well as the discharge, may be present in patches. The cervix should be inspected, as the infection generally begins in it. The differential diagnosis between simple and specific vaginitis is often difficult. The history of a distinct infection would be valuable, but it is often too delicate a subject for question. It may be suspected from the sudden onset of the attack, associated with urinary symptoms, a protracted course, and obstinate resistance to treatment. The inflamed urethra and ducts of the vestibule and orifice of Bartholin's ducts, and not infrequently the formation of cysts or abscesses in the ducts or glands, with swelling of inguinal glands, afford additional confirmation. The recognition of the gonococcus by culture or by microscopic investigation renders diagnosis certain. The absence of the gonococcus is not proof positive of non-gonorrheal origin, for the gonococcus may disappear from the secretion.

Even when the specific origin can be determined beyond peradventure we should be exceedingly cautious in giving expression to our opinion, as it may cause serious social unhappiness. We must not be content with the diagnosis of simple vaginitis, but should carefully interrogate the various structures in order to determine, if possible, its cause. Pelvic abscesses discharging into the vagina have been mistaken for vaginitis.

350. **Prognosis.**—The ease and rapidity with which vaginitis can be cured will depend upon the cause. The milder cases can be confined to the external genitalia, or may disappear even after the Fallopian tubes have become affected. In the more severe forms the entire genital tract may be rapidly involved, and portions of the tract may retain the disease and reinfect other portions. The general health is impaired in the chronic cases. The ovum, when it can enter, may find the uterus unfitted for its retention or an abortion may result. Preexisting gonorrhea is

said not to disturb the first two weeks of the puerperium, but subsequently there is a marked tendency for the germs to develop renewed virulence and to invade the healthy structure.

351. **Treatment.**—In acute cases the patient should be kept absolutely quiet in bed. Sexual activity should be suspended. The diet should be restricted to nonstimulating articles. Alcoholic stimulants, peppers, and various condiments should be interdicted. Saline laxatives are administered, and the patient is encouraged to drink largely of emollient liquids or alkaline waters.

Local applications should consist in alkaline douches and in a saturated solution of boric acid in hot water, given for fifteen to twenty minutes out of every two or three hours during the day, and every four while the patient is recumbent at night. The ordinary fountain syringe serves well, or a piece of rubber tubing weighted at one end and provided with a clip and nozle at the other. The weighted end, with the coiled tube, is placed in a basin of water above the level of the bed, the clamp applied, and the end of the tube withdrawn and introduced into the vagina. The clip opened, the water is siphoned out as long as the external end is kept below the level of the basin. As the acute symptoms subside, give douches of solutions of sublimate (1:4000), potassium permanganate (1:4000), one per cent. carbolic acid, lysol, or creolin every three hours for two weeks; after which, give double the strength four times daily. The dry treatment consists in cleansing the surface by a douche or by washing the vagina through a speculum; after which, dry and pack with borated or iodoform cotton, and repeat every eight hours until the secretion is checked, when it is given twice daily. A dry absorbent dressing must be applied to the vagina every two hours.

Astringent douches are substituted in chronic cases and after the subsidence of the acute stage. Cleanse and dry the vaginal walls and paint with silver nitrate solution (ʒj : f℥j), followed by a tampon saturated with a solution of bismuth in glycerin, which keeps the walls separated. Fritsch recommends zinc chlorid (gr. ij : f℥j). A one per cent. solution of lead acetate, zinc sulphate, or alum sulphate, potassium permanganate (1:2000), or painting the surface with undiluted tincture of iodin are serviceable. Acceptable powders are equal parts tannin and iodoform, and bismuth subnitrate and chalk, retained with a tampon. In senile vaginitis cleanse with a saturated boric acid solution. Tampons may be saturated with a 0.5 per cent. solution of lead acetate, or strips of lint may be saturated in a five per cent. solution of carbolic acid in glycerin or smeared with zinc ointment. Vaginal suppositories of tannin and iodoform, each five per cent.; zinc oxid, ten per cent.; or lead acetate, two per cent, may be employed. When the condition is very chronic, spray through a speculum with a two per cent. solution of silver nitrate. The spray drives the medicine into the crypts and folds, and is far more effective than swabbing. I have derived more benefit from tampons anointed with ichthyol in lanolin (1 : 4). It causes a desquamation of the entire epithelium of the vagina and is destructive to the gonococcus.

INFLAMMATION OF THE CERVIX AND BODY OF THE UTERUS.

352. **Classification.**—In the light of our present knowledge the classification of uterine inflammation is a difficult and perplexing problem.

Various views have been presented. The existence of inflammation of the endometrium, except in acute conditions, has been denied. The so-called chronic inflammation is denominated catarrh and uterine congestion, and is frequently attributed to peri-uterine inflammation. This statement would seem a distinction without a difference, and results from failure to appreciate the varying character of inflammatory changes in different tissues. The continuous mucous membrane is exceedingly vulnerable to the possibilities of infection. The irritation thus produced results from inflammation. Its violence and extent will depend upon the virulence of the poison and upon the resistance of the patient. It may vary from a slight inflammation involving only the cervix to one which extends to the entire uterine cavity, with infiltration of the submucous structures, and becomes interstitial or parenchymatous, not infrequently, in virulent attacks, passing through the wall to its surface and causing perimetritis. In our early classification we spoke of metritis, in the sense of inflammation of the entire organ; when it is confined to the lining membrane, it is called endometritis. In involvement of the deeper structures it is known as parenchymatous or interstitial metritis, and as perimetritis when the peritoneum is involved. The latter condition is generally described as pelvic peritonitis, because, although inflammation can reach the peritoneum as described, it more frequently does so by the progress of the inflammation through the tubes, and the inflammation is much more extensive.

The arrangement of the cervical mucous membrane renders it evident why inflammation may be confined to the cervix, although in puerperal women it is very prone to extend to the body.

The various classifications are based upon clinical phenomena, pathologic changes, and causal relations. The ideal classification is that of Doderlein, into two divisions: first, inflammation produced through the influence of micro-organisms; second, inflammation independent of their influence. The former is subdivided into: (*a*) septic and saprophytic; (*b*) gonorrheal; (*c*) tubercular; (*d*) syphilitic; (*e*) diphtheric. The knowledge of the influence of micro-organisms does not as yet seem sufficient to justify so careful a differentiation, and we are not in a position to assert that there is any inflammation that is absolutely independent of their production. My experience in teaching has led me to discard the classification based upon the clinical phenomena, as it is difficult in such cases to associate in the mind the pathologic relations. For this reason I propose to present the simpler and more frequently employed classification into acute and chronic, the latter subdivided into cervical catarrh, or endocervicitis, endometritis, and metritis. Acute endometritis affects both body and cervix. The chronic inflammation can be localized in the cervical mucous membrane. The classification of uterine diseases is still further complicated by the physiologic changes which occur in the uterus as a result of menstruation. Thus, the uterine mucosa undergoes a periodic hypertrophy and degeneration, and it is often difficult to differentiate between the physiologic condition and early pathologic processes.

353. **Endocervicitis—Chronic Cervical Catarrh—Cervical Endometritis.**—This is an inflammatory process which involves the mucous membrane of the cervical canal. The mucous membrane is inflamed, and when the external os has been lacerated, the lips will be separated or gaping and the mucous membrane everted, presenting irregular granular patches that protrude beyond the os. This condition was formerly regarded as ulceration. Examination of these patches shows, first, the raw surface covered with epithelium; second, granular points and new forms unconnected with the papillæ.

On microscopic examination the mucous membrane will be found to be covered with a single layer of epithelium, the cells of which are smaller than normal. The subjacent vascular tissue shines through this layer, producing a redness and presenting numerous folds, glandular recesses, and processes, causing a granular appearance. This is what is described as simple erosion. When the recesses are long and narrow and the surface is split into distinct papillæ, it is known as papillary erosion. Not infrequently the ducts of the glandular recesses become obliterated, producing retention cysts. These are known as the ovules of Naboth. They form nodular projections around the orifice of the external os, or they may project deeply into the cervical tissue or stand on the vaginal surface at some distance from the external os. As these glands do not exist upon the vaginal surface of the cervix in a normal condition, they have evidently been extruded or pushed through the structure of the cervix, so that we may find an extensive cystic degeneration. As they increase, they burst, producing what is known as follicular erosion, in which the whole cervix may be affected. The increased secretion from the glands and the transudation from the eroded surface produce a very profuse leukorrheal discharge. It is sometimes a question as to the origin of the protruded structure, but it evidently arises from proliferation of the epithelial lining of the cervical glands. Chronic inflammation in the other tissue of the cervix produces an increased formation of connective tissue, resulting in anteroposterior thickening, sometimes elongation. Not infrequently, in bilateral laceration of the cervix, the lips may be widely everted, and turned outward, like the top of the celery stalk. The secretion in the obstructed glands becomes inspissated, producing retention cysts, which are felt as firm, pea-like masses, or ovula Nabothi, in the substance of the cervix. These cysts may suppurate, causing small abscesses. Occasionally, with a number of these cysts in contact with

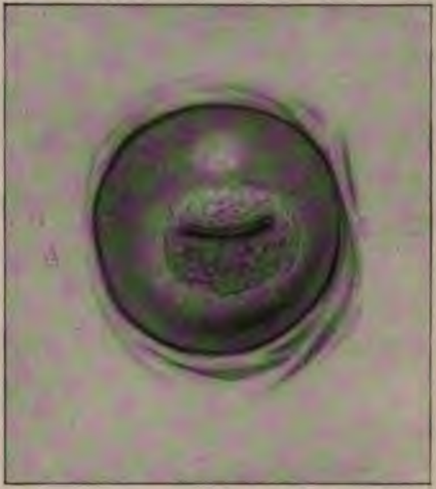

Fig. 281.—Simple Papillary Erosion of the Cervix.

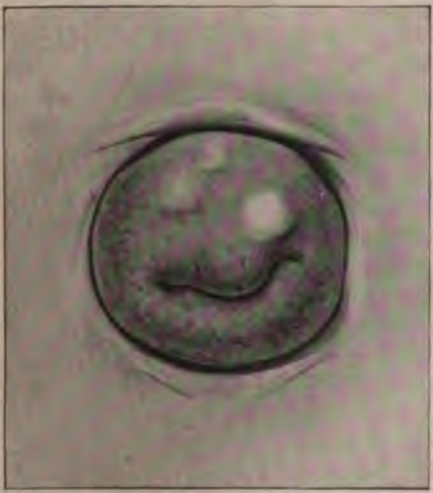

Fig. 282.—Simple Papillary Erosion with Enlarged Follicles.

one another, intervening walls break down, forming a large cyst. The projection of such a mass into the cavity of the cervix, and the associated menorrhagia, may very readily lead one to suspect the possibility of malignant disease. Puncture of the cyst permits a large quantity of clear, straw-colored fluid, rich in corpuscles, to escape, and the cavity to contract, which renders its character definitely determined. From these observations it can readily be inferred that the various structures—the epithelium, the glands, and the connective tissue—of the cervix are all involved in inflammation. When the glands are extensively involved, the cervix undergoes what is known as cystic degeneration. The increased amount of connective tissue in the chronic process produces what Thomas describes as areolar hyperplasia, or cervical sclerosis.

354. **Causes.**—Cervical inflammation arises, in the majority of cases, from injury during parturition, the most frequent injury being laceration of the cervix. It may extend from the vagina to the cervix in gonorrheal and simple vaginitis, or from the uterine body to the cervix. The latter is more likely to occur, from the fact that the uterine discharges flow over the cervical mucous membrane and irritate it. Endocervicitis is particularly likely to be produced, from congestion of the uterus in association with flexion, and especially with retroflexion. In the latter, separation of lacerated surfaces is favored and the delicate cervical mucous membrane is exposed.

355. **Symptoms.**—The symptoms are leukorrhea; pain in the back and loins, aggravated by exercise or standing; irregular menstruation; and sterility. Leukorrhea is the most important symptom. The normal secretion from these parts is insufficient to attract attention. When it is excessive, it becomes known as leukorrhea, or, in popular language, the whites. A temporary discharge—a transparent leukorrhea, like white of egg—not infrequently occurs preceding and following the menstruation, due to temporary congestion. The secretion from the cervical glands is clear and viscid, resembling white of egg. It becomes white when mixed with mucus-corpuscles, and yellowish when pus-corpuscles are present. Not infrequently it is tinged with blood, which escapes from the delicate vessels of the newly formed vascular tissue. Pain is aggravated by walking, standing, riding, or anything which increases the friction between the cervix and the vaginal walls. Menstruation is irregular and there is generally an increase in the quantity of the flow, probably produced by an extension of the inflammation to the endometrium. Sterility is often present. In the nulliparous woman suffering from endometritis the cervical canal is filled

by a plug of mucus, which may afford a bar to conception. In the multiparous woman the presence of cervical inflammation may render the woman less susceptible to pregnancy, but is not an absolute obstacle to conception.

356. **Physical Signs.**—The appearance and outline of the cervix varies in the nulliparous and in the multiparous woman. In the former it is puffy and large; the os soft and velvety. The patient will complain of pain when the cervix is moved or pressed. In the multipara the cervix is lacerated; its margins are soft, velvety, and eroded, or hard, presenting pea-like nodules, polypoid projections, masses of cyst; or the os may be gaping, so as to permit the introduction of the finger nearly to the internal os. The mucous membrane is irregular, not infrequently presenting longitudinal ridges. Digital examination affords an idea as to the position and relation of the cervix, and as to its condition, whether lacerated or otherwise. The digital examination should be supplemented by the use of the speculum, the latter being used to confirm suspicions which have been engendered by the digital examination. The Sims speculum is preferable, as it affords less displacement to the parts and permits more thorough and complete inspection. In the nullipara the os will be filled with a plug of tenacious mucus surrounded by a patch of excoriated tissue, particularly in the posterior lip, in which the outer layers of the epithelium have been desquamated. In the multipara a laceration will probably be seen. Its presence is often overlooked, because the fissures are filled up with indurated cicatricial tissue. The use of tenacula to turn in the surfaces demonstrates its existence. The bluish-red ovula Nabothi may be readily seen as nodular projections upon the surface.

357. **Diagnosis.**—Cervical catarrh is readily determined from vaginal inflammation by the use of the speculum. A plug of mucus in the former will fill up the cervical canal and project from it, being so viscid and tenacious that it is difficult to remove it. To thoroughly cleanse the surface of mucus it may be necessary to use a curet, and, by drawing it over the surface, to press the mucus out of the glands, thus favoring its removal. When the cervical discharge is insufficient to render it visible, Schultze's method may be employed, in which he gives the patient a vaginal douche, introduces a speculum, thoroughly cleanses the surface, and places a tampon soaked with a solution of tannin against the external os. This applied at night and removed through a speculum the following morning, the character and quantity of the discharge from the cervix can be noted. The differentiation between endocervicitis and endometritis is still more difficult. In many cases, indeed, we may not be able

to say definitely that a cervical catarrh is not associated with more or less inflammation of the endometrium. The enlargement and thickening of the cervix demonstrate that it is the seat of inflammation. When it is very much thickened and indurated, presenting a hard, dense mass, malignant disease should be suspected.

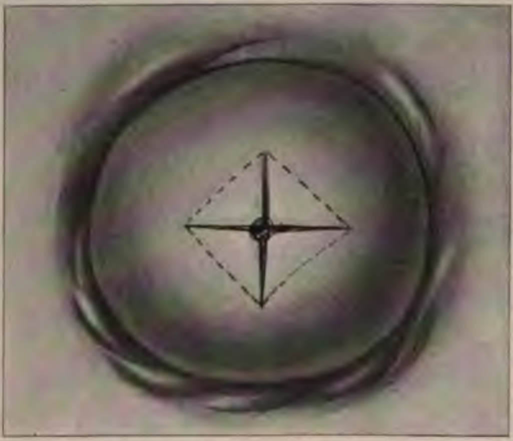
Fig. 283.—Lines of Incision for Contracted or Pinhole Os.

358. Prognosis.—The curability of the condition is dependent upon the general health of the patient, the duration of the disease, and the extent of involvement. Not infrequently it will be found that these patients have passed through the hands of a number of physicians, and extreme care must be exercised as to the prognosis. The result is less favorable when there is a large amount of secretion and apparently but little granular degeneration.

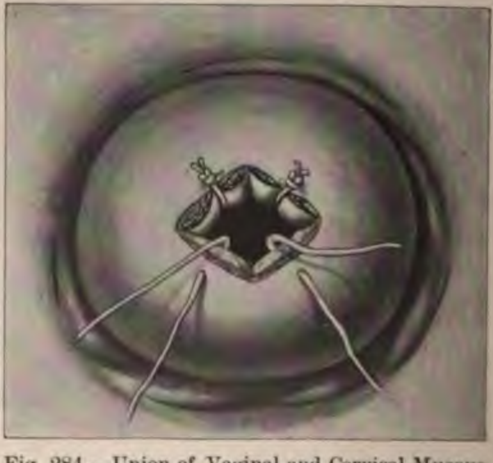
Fig. 284.—Union of Vaginal and Cervical Mucous Membranes.

359. Treatment.—First, constitutional: The patient should be encouraged to take outdoor exercise, and not infrequently change of air will be advisable. Tonics, such as quinin, iron, strychnin, arsenic, and the bitter tonics, will be of advantage. Indigestion should be corrected, regular action of the bowels secured, and sexual rest directed.

Second, local treatment: In the nullipara give hot vaginal douches with a fountain syringe under moderate pressure for from ten to fifteen minutes each night, the patient preferably in the recumbent position. The temperature of the water should be from 110° to 115° F., and following the douche the patient should remain in bed. Astringents or antiseptics may be added, as a solution of zinc sulphate (ʒj–ij : Oj) or of corrosive sublimate (1 : 4000). When the os is narrow and contracted, so that drainage is ineffective, it should be notched bilaterally with scissors to permit the escape of the mucus; the lips should be trimmed, making a funnel-shaped opening. When the secretion continues, local applications, such as tincture of iodin or carbolic acid, may be made—the former in mild, the latter in severe, cases. Haywood Smith recommends acid nitrate of mercury; De Sinety, chromic acid. In making the application, the mucus should first be removed from the canal with a cotton-wrapped applicator or a blunt curet. This step is important to prevent the application being coagulated by the mucus without reaching the affected surface. After the application any surplus fluid should be removed, and a tampon of cotton or of gauze saturated with glycerin should be placed beneath the cervix. A 25 per cent. solution of ichthyol in glycerin, or ichthyol in lanolin, of the same strength, may be applied to the cervical canal with a cotton-wrapped probe, or a small pledget of gauze or cotton anointed with it may be carried into the dilated cervix, or a tampon medicated with it may be applied to the eroded cervix. It is of particular advantage because of its germicidal action. The application of such a tampon will not infrequently result in the desquamation of epithelial casts, followed by a regeneration of the epithelium and a healthy appearance of the cervix. The application of a saturated solution of iodoform in ether is advised. Ether stimulates contraction of the glands and forces out the secretion, while the iodoform remaining acts as an antiseptic. In the multipara endocervicitis is not infrequently complicated by retroflexion, subinvolution, or laceration of the cervix. The first consideration should be to relieve congestion by hot astringents, antiseptic douches, or the use of glycerin tampons. The displacement should be corrected and the organ should be maintained in a proper position by a tampon or by the use of the pessary. When the cervical mucous membrane is much everted and the lips are widely separated by laceration of the cervix, the relief of the engorgement and congestion should be followed by Emmet's operation. Frequently, the uterine congestion may be decreased by local depletion through scarifying or puncturing the cervix. This procedure is of special value where a number of glands of Naboth have become obstructed and formed retention cysts. Puncturing the cysts and introducing tincture of iodin or carbolic acid produces a sufficient amount of inflammation to obliterate the cavity and remove the pressure. In very obstinately chronic cases destruction of the diseased glandular tissue is imperative. It may be accomplished by the use of the Paquelin thermocautery or by various caustics. Skoldberg recommends zinc alum sticks, which are made by running together into molds equal parts of zinc sulphate and alum sulphate, forming a small stick, which is carried into the cervix and retained by a plug of wadding in the vagina, which also receives the discharge. Silver nitrate in solid stick was formerly much used for this purpose. The latter method of treatment is required only in exceedingly severe cases, and its application should be extremely limited. It cures by destruction of the mucous membrane and glandular structure, substituting for them cicatricial tissue. It should not be used where there is danger of the cervical canal becoming contracted so as to interfere with drainage from the uterine cavity. Colpe, finding that the inflammation did not yield to the use of astringents and caustics, examined the secretion and found mycotic spores present, after which he used lactic and salicylic acids, with immediate relief.

Electricity has its advocates—the negative pole introduced into the cervix, while the positive pole is placed upon the abdomen. It is questionable, however, whether this plan of treatment has any advantage over other caustic measures. The use of the sharp curet not only removes the glands from the cervical canal, but, as advocated by Thomas, scrapes away the arbor vitæ from the internal to the external os. This measure not infrequently has to be repeated a second or even a third time before relief is complete. When there is very marked eversion, or an eroded, deeply fissured surface, Schroeder's operation should be performed. This consists in the formation of a single flap in each lip. The method of procedure has been described. (Section 287.) Martin removes a larger amount of the cervix, and combines amputation with excision. He splits the cervix into two lips, cuts through the cervical mucous membrane on the posterior lip above the diseased portion, then removes as much of the lip as is necessary, and stitches it. The anterior lip is treated in the same way.

360. Acute Metritis and Endometritis.—In acute inflammation the pathologic changes are not confined to the endometrium, but involve the wall. In the nonpuerperal uterus they are produced by infection from gonorrhea or as a result of trauma during exploratory operative procedures or of exacerbations of the chronic state. This class of cases is rare, and hardly ever fatal or sufficiently threatening to require hysterectomy. Inflammation is generally produced by infection during parturition or abortion, and consequently is more an obstetric than a gynecologic affection.

Infection is favored:

1. By protracted labor during which the tissues have been subjected to bruising or laceration.
2. Through want of skill or of cleanliness in the practice of manual or instrumental procedures.
3. From the retention of clots or of portions of placenta or decidua after labor or abortion.
4. By the presence of septic germs in the genital canal prior to the interruption of gestation or by their introduction during the process of delivery or in the subsequent convalescence.

361. **Pathologic Alterations.**—The infection is originally implanted in the degenerated mucous membrane, the blood-clots of the uterine sinuses, or the site of the placenta. Intense hyperemia results, producing alterations in all the tissue elements. The gland lumen is dilated by proliferation of glandular epithelium. The blood-vessels are enlarged and there is general small-cell infiltration. The mucous membrane is greatly thickened, its epithelium is desquamated, and hemorrhagic infarcts take place into its connective tissue, with cell infiltration and edema of the muscular wall, followed by localized pockets of pus in the wall or sinuses, some of which were probably preceded by small thrombi.

Adjoining pus pockets may coalesce and form an abscess of considerable size, which may rupture into the uterine cavity, and thus terminate favorably, or a large portion of the uterus may be destroyed, causing the death of the patient. A case occurred under my observation in the Philadelphia Hospital in which the entire fundus was destroyed.

362. **Varieties and Their Source.**—The symptoms are dependent upon the character of the infection, and can be divided into sapremic and septicemic. The former are produced by the action of the saprophytes upon retained clots and portions of decidua or placenta, resulting in decomposition and the absorption of its products. Decomposing material undisturbed renders the soil favorable for, and promotes the development of, septicemia. The latter condition occurs more frequently, as the primary disorder, from the entrance of pathogenic germs through fractures of the mucous membrane of the body, cervix, vagina, or vulva.

It has already been asserted that inert pathogenic germs present in the vagina can, by favorable conditions, be stimulated into activity, but they are more frequently introduced through want of proper antiseptic or aseptic precautions upon the part of the physician or nurse.

363. **Symptoms.**—*Sapremia* is indicated by elevated temperature and rigors, from three or four to ten days following delivery. The temperature varies from 102° to 105° F. The patient may have several chills daily. The lochial discharge is arrested or quite foul. She will have but little tenderness upon pressure. Manipulation may be followed by uterine contraction and by the expulsion of a large, offensive duct, when the patient will improve, or she may suffer from hemorrhage. Digital examination reveals the presence of retained masses and affords evidence of decomposition.

In *septicemia* the onset is more insidious, but the symptoms occur earlier. The reaction will depend upon the condition of the patient, the time of infection, and the virulence of the poison. As early as the second or third day the patient may exhibit an elevation of temperature, which gradually increases. She suffers from pain or tenderness over the lower abdomen, which may be so marked as to confine her to the dorsal decubitus, with her limbs flexed, and unable to evacuate urine. The pulse is rapid, from 110 to 140, the respirations are frequent, and the temperature varies from 101° to 107° F. The lochial discharge may be arrested or free, and may be mucous, mucopurulent, ichorous, or sanguinolent. It may be offensive or almost free from odor. The cervix and vagina, upon inspection, appear normal, or are highly inflamed, covered with a glairy mucus, or present patches of diphtheric exudation. The uterus can be smooth, firm, exceedingly tender to pressure; the cervix lacerated, baggy, as if swollen; or the entire organ enlarged, edematous, and flabby. With the inflammation confined to the uterus the organ will be tender and enlarged, but not so sensitive as to preclude palpation.

If the serous coat is involved, the pain and tenderness are very acute, and the limbs are drawn up to protect the abdomen from the pressure of the clothing and to relieve the traction upon the abdominal muscles.

The course of the disease will depend upon the virulence of the poison and upon the resistance of the patient. In the sapremic condition the source of origin of the disease may be expelled, when the products of decomposition are soon eliminated.

In septicemia the patient may fortunately secure immunity to the further progress, and may slowly recover. The disease may become localized, and may be spontaneously or artificially evacuated, or the general system may become so infected that, notwithstanding every therapeutic measure, the patient succumbs.

An unfavorable *prognosis* would be indicated by a persistently high temperature, a pulse-rate continuously above 130, with the absence of localized foci. With the cessation of the serious symptoms and an improvement in the general condition of the patient, the continuation of a rapid pulse-rate and an occasional evening temperature of 100° F. or over should be regarded as danger-signals.

364. Diagnosis.—The history of the illness, the size and tenderness of the uterus, and the character of the lochial discharge are sufficient to determine the disease. The early differentiation between sapremia and septicemia is important. The former is associated with retained decomposing products, and rapidly subsides after their removal.

365. Treatment.—Prophylaxis is most important, but is so closely associated with the department of obstetrics that we will not consider it.

We should examine the uterus at once and remove any decomposing masses. The uterine cavity and wall should be carefully examined, by one or two fingers through the cervix and the hand upon the abdomen. This procedure removes debris and infected clot from vessels, and should be associated with and followed by intra-uterine douches of sterile normal salt solution (6 : 1000) or formalin solution (1 : 1000–1500). If the uterine cavity is clear of masses, the condition is one of septic infection, as contradistinguished from putrid intoxication, and intra-uterine manipulation will be unproductive of much result. The germs have already penetrated beyond the reach of local measures. Curetment, by opening fresh avenues for infection, is harmful. The local inflammation will be benefited by cleanliness, through the use of hot douches. The uterine cavity should be irrigated three or four times daily, or more frequently, through a double-current tube, with a hot normal salt solution, a formalin solution, or a solution of bichlorid (1 : 3000). When the latter is used, it should be followed by a normal salt solution, to prevent the danger of mercuric poisoning.

In sapremia, or putrid intoxication, the removal of the decomposing material, irrigation of the uterus, and internal administration of salines usually establish rapid convalescence. In sepsis, however, we deal with micro-organisms which have entered the blood, and kill, not so much by their presence, as by the toxins or poisons which they secrete.

Researches have demonstrated that these toxins, obtained from pure cultures of the bacillus and injected into the circulation of some of the lower animals, soon generate an antitoxin which antagonizes the original poison. This accumulation of [illegible] Marmorek and [illegible] Lindström, but [illegible] hypodermic injection [illegible] centimetres [illegible] should be used. In [illegible] six cubic centimetres [illegible] repeated daily until the [illegible].

In [illegible] administration of the serum is followed [illegible] and temperature. The [illegible] instituted the more [illegible] strength of the patient and [illegible] maintained by the [illegible] of supporting remedies, by a nutritious, easily digested diet, and [illegible] use of stimulants. Give [illegible] grains of quinine [illegible] three or four times daily, strychnine [illegible] hypodermically [illegible] will leave the [illegible] of the bowels should [illegible], which favors the [illegible] must be exercised to avoid [illegible].

Localized [illegible] abscess in the uterine wall [illegible] or in the ovaries. These [illegible] and suitable local treatment. [illegible] upon the extent [illegible] exudation [illegible] the cellular [illegible] may be avoided.

366. Chronic endometritis is [illegible] of the mucous membrane [illegible] is the [illegible] follows [illegible]. It is divided by R[illegible] according to the [illegible] involved. In [illegible] of the membrane [illegible]. With thickening of the [illegible] elongated, dilated, [illegible] and proliferated, [illegible]. The vessels of the deeper portion of the [illegible] in a state of congestion. The [illegible] three or four times its normal thickness [illegible] easily scraped away. The surface presents vegetations or growths, which, according to De

Sinety, are of three forms. In one, the tissue consists of dilated blood-vessels; in the second, of dilated, hypertrophied glands; in the third, of embryonic tissue containing but few blood-vessels and only traces of glands. With these conditions are associated three kinds of discharge—sanguinolent, leukorrheal, and muco-purulent. As a result of the changes in the mucous membrane, not infrequently portions project as polypoid masses, which consist of either glandular or vascular structure. In this condition the mucous membrane is thickened and is granular in appearance, and the state has been called villous degeneration, or endometritis fungosa. With cell proliferation in its connective tissue and the subsequent contraction of the gland, its structure is compressed and obliterated, so that the surface is almost free from glands. Or, again, the orifices of the glands become occluded and cysts result. The hyperplasia of the uterine mucosa in some cases results in the desquamation of the epithelial layers at each menstrual period. This desquamation may take place in the formation of shreds or in a complete cast of the uterus, in which the orifices of the Fallopian tubes and the internal os are recognized.

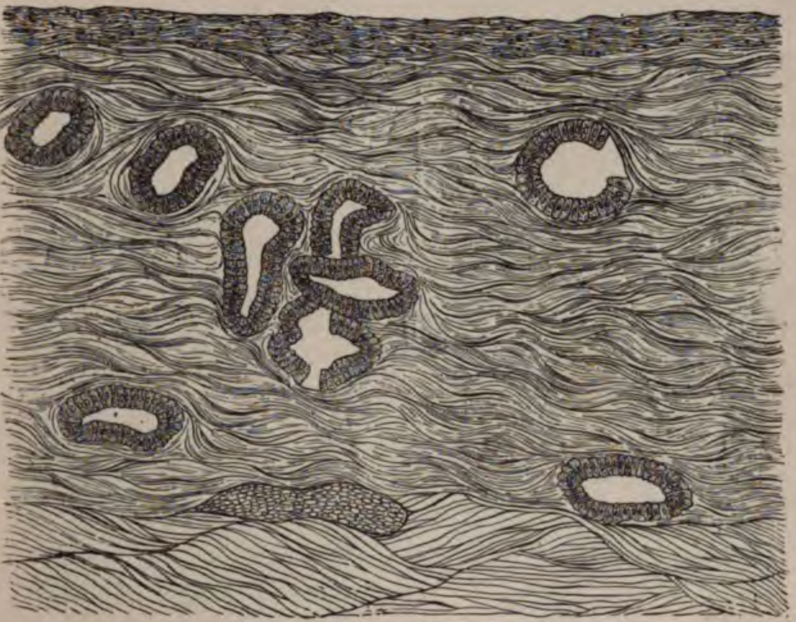

Fig. 285.—Interstitial Endometritis with Partial Atrophy of Glands.

This condition is known as exfoliative endometritis, or membranous dysmenorrhea.

367. **Symptoms.**—The disease arises after abortion or labor, as a result of an attack of uterine inflammation, or an attack of gonorrhea. Occasionally, it may begin insidiously and without any sign of a cause. It occurs more frequently in the multiparous, and it is more common in the later menstrual life. Nulliparæ are not exempt; even virgins are sometimes affected—a condition known as virginal endometritis. This especially occurs in narrowing or stenosis of the external os. A form of the disease occurs subsequent to the climacteric, when it is known as senile endometritis. Endometritis is characterized by the following symptoms: leukorrhea and menorrhagia. The discharge from the body of the uterus is less viscid than that from the cervix. It may be clear, but more generally is mucopurulent; occasionally it is tinged with blood, so that the patient imagines herself continuously unwell. The discharge flows freely or there is an apparent accumulation. Retention of the discharge and its evacuation in considerable quantity occur when endome-

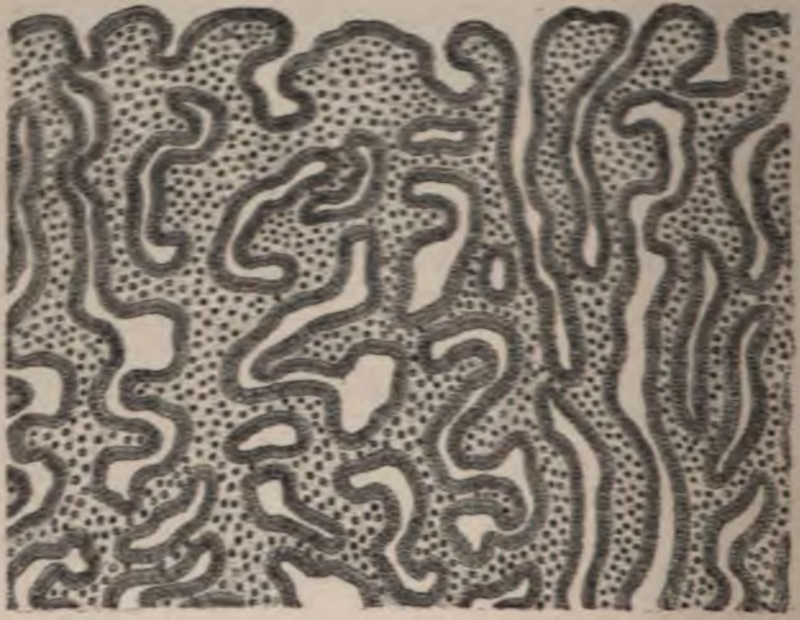

Fig. 286.—Dilated and Hypertrophied Glands. Glandular Endometritis.

tritis is complicated by retrodisplacements or when the os is small. The discharge may have an offensive odor and be so irritating as to give rise to extensive excoriation of the vulva.

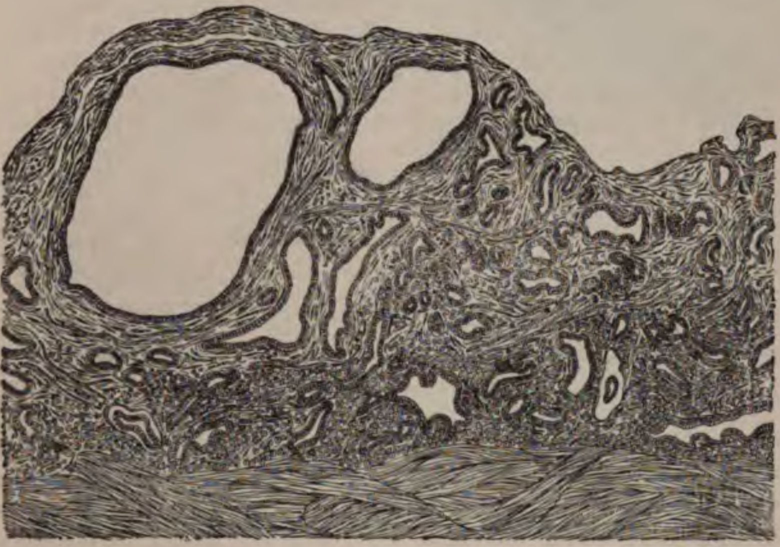

Fig. 287.—Polypoid Masses Associated with Chronic Endometritis.

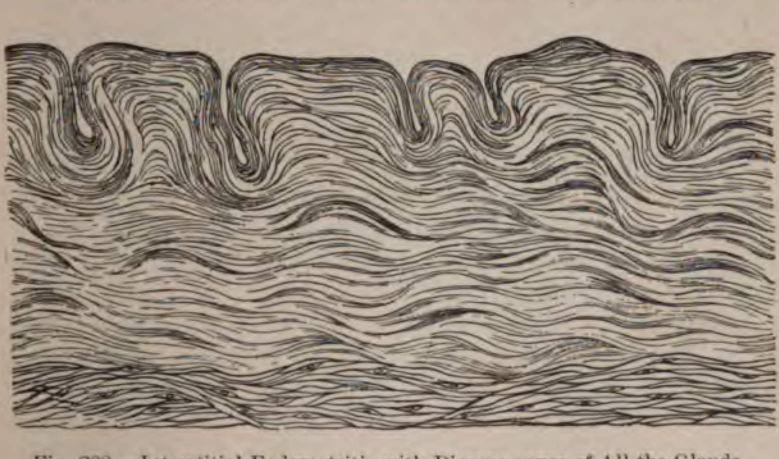

Fig. 288.—Interstitial Endometritis with Disappearance of All the Glands.

Excessive menstrual flow, or menorrhagia, may or may not be present. Occasionally, it is so profuse as to occasion a suspicion of malignant disease and as to produce a profound anemia. The dysmenorrhea, or exfoliative endometritis. The influence of endometritis upon conception is not fully determined, but the increased frequency with which women become pregnant subsequent to a curetment renders it evident that it has a restraining influence upon the occurrence of conception. Endometritis is a prolific cause for abortion.

368. Diagnosis.—The existence of leukorrhea and of irregular and profuse menstruation, associated with enlargement of the uterus for which no explanation external to the uterus can be found, justifies the suspicion of endometritis. The history of abortion, or prolonged convalescence subsequent to labor, confirms the suspicion. The use of the curet is of incalculable advantage in determining the diagnosis. Portions removed with the curet will show small-cell infiltration of the entire glandular tissue, without glandular hyperplasia, or marked hyperplasia of glands with proliferation of the glandular epithelium. Endometritis, when uninterrupted, extends to the deeper structures, producing metritis. It predisposes to malignant change. When permitted to pursue an undisturbed course, it can involve the peri-uterine covering. Deposits occur in the cellular tissue about the ovary or around the orifice of the Fallopian tube, or the disease involves the pelvic peritoneum. Neglected cases result in cellulitis, salpingitis, ovaritis, peritonitis, the formation of abscesses, the destruction of tissue in the organs, and not infrequently, alas, in loss of life!

369. Treatment.—Constitutional treatment is of marked value, and will be discussed in chronic metritis. Prophylaxis will require rigid asepsis during labor or abortion, as well as in making gynecologic examination. A rise of temperature or the suspicion of the retention of a portion of placental debris should be considered as indicating the necessity for thorough use of the curet, free irrigation, and, in many cases, gauze packing. Laceration of the cervix or of the pelvic floor should have early repair. All suspicious discharges must be removed by treating the cause. Before the third or fourth day a gonorrheal endometritis is best treated by frequent irrigation with antiseptic solutions, such as permanganate of potash (1:2000–3000). If it has existed for some days, curet and pack with iodoform gauze. Careful antiseptic or aseptic cureting is the proper form of treatment in all forms of endometritis, whether complicated or uncomplicated. In serious cervical lesions, with much eversion and thickening of the mucous membrane, cureting should be associated with Schroeder's operation upon the cervix. Drainage is of incalculable advantage in endometritis when complicated with slight catarrhal salpingitis. It will also prove serviceable in mild forms of peri-uterine inflammation. It should be considered contraindicated in well-established pathologic changes in the adnexa and in chronic peri-uterine inflammation unless it immediately precedes, at the same operation, an abdominal incision for the correction of the pelvic lesions. In addition to curetment, intra-uterine treatment consists in the use of antiseptics and caustics. Free drainage should be considered as a prerequisite to all intra-uterine treatment. The inflamed uterine canal is similar to a sinus. Unless the pent-up discharges have free vent, the irritation is aggravated. When the canal is patulous, large injections of a feeble antiseptic solution through a return-current catheter can be employed, such as formalin (1 : 2000), normal salt solution, or a two per cent. solution of bicarbonate of soda. The latter solutions, when used, are as salutary as the more distinctly defined germicidal agents. If the catarrhal canal is insufficiently large, it should be dilated with laminaria tents, after which irrigation should be practised. In mild cases the canal may be swabbed, by means of a cotton-wrapped applicator, with tincture of iodin; in more severe cases, with carbolic acid. When the mucous membrane is thickened, and tends to bleed or to furnish a profuse discharge, more active agents may be employed: silver nitrate, gr. xxx, to aq. destil., ℥ss–j; zinc chlorid, ʒj–iv, to f℥j; acid. chromic., gr. x–xxx, to f℥j; fuming nitric acid, acid nitrate of mercury, tincture of chlorid of iron, pencils of silver nitrate, zinc chlorid, zinc sulphate, or copper sulphate. When strong caustics are used, precautions must be practised to protect the healthy vagina from contact with the solution. A mass of absorbent cotton should be placed beneath the cervix prior to the application, and the superfluous caustic should be removed by sponging before the pledget is withdrawn. Pencils are objectionable in that they produce sloughing of the cervical mucous membrane and cause the occurrence of atresia.

Tampons.—Intra-uterine treatment should be supplemented by placing beneath the cervix a tampon, preferably saturated with a preparation of glycerin, a 50 per cent. solution of boroglycerid in glycerin, a 10 to 15 per cent. solution of ichthyol in glycerin, or a 25 per cent. ointment of ichthyol in lanolin. The following prescription is an excellent astringent and antiseptic:

℞.	Pulv. alum.,	f℥j
	Acid. carbolic.,	ʒvj
	Glycerin.,	Oj.

Various ointments, either astringent or alterative, with lanolin as a base, may be used upon the tampon. A tampon improves the circulation by raising the uterus to a higher level and maintaining it there. The antiseptic tampon may be retained from twenty-four to seventy-two hours according to its character. When the tampon is not used, or after its removal, a vaginal douche of two or three quarts of hot water (110° to 120° F.) should be used twice daily, with the patient in the recumbent position. In very hot injections cover the vulva and perineum with vaselin, to prevent burning. Scarification under continuous irrigation will often prove of advantage, and is more effective than leeches. An iodoform gauze tampon should follow. Intra-uterine injections have been employed for endometritis, but should never be used unless the canal is sufficiently patulous to permit the escape of the superfluous fluid. The preferable plan is to employ a pipet or syringe by which one, two, or three drops may be introduced. Occasionally, even this small quantity will cause violent uterine colic. These attacks are not necessarily dangerous, but they are not calculated to encourage the continuation of treatment.

The treatment *par excellence* in chronic endometritis is the use of the curet.

370. **Chronic Metritis.**—Chronic metritis is an inflammation in the muscle-wall of the uterus, leading, when long continued, to increased connective tissue formation. The term metritis is used in a comprehensive sense, and comprises conditions which have been described by different writers under such terms as chronic parenchymatous inflammation (Scanzoni); subinvolution (Simpson); diffuse proliferation of connective tissue (Klob); infarction (Kiwisch); hyperplasia of fibromuscular tissue, similar to fibroid tumors (Virchow); diffuse interstitial metritis (Noeggerath); irritable uterus (Gooch). The term may be criticized from a pathologic standpoint, as there is no chronic inflammation of the muscle-fiber of the uterus, but an increased amount of connective tissue, out of proportion to that of the muscle-fiber. Clinically it is satisfactory, as it enables us to comprise under one term a variety of conditions which may be developed from different causes but produce a similar group of symptoms. It has been objected to this term that, by inference, there has been a profuse acute inflammation, which is not the case, as chronic inflammation of the uterus does not follow the acute. It is more correctly described as an increased tissue formation, dependent on long-continued congestion. The term chronic is applied to analogous forms of inflammation in other organs and structures of the body, as cirrhosis of the liver, which describes a condition similar to that which is found in the uterus. Subinvolution is, in some English books, described separately, though it is due to the same cause.

The differential diagnosis between it and chronic metritis is impossible, and the treatment of the two conditions does not differ. The altered condition of the uterus will vary with the period at which the patient comes under observation. In the early stages the organ is enlarged, hyperemic, and soft. Later, it may decrease in size, though it is still large, and then becomes hard, indurated, and anemic. The enlargement of the organ is uniform, so the shape is not altered. Upon opening the abdomen of such a patient, the peritoneal surface will present a normal color, or patches of extravasated blood may be present. On section, in the early stages the tissues will be soft, hyperemic, easily incised; later, firm, cartilaginous, presenting a whitish color, the walls thickened, and the cavity of the uterus enlarged. Not infrequently the organ will be found as firm and dense as a mature fibroid growth. During the first period, De Sinety says, the dominant lesion is the presence of a large number of embryonic elements throughout the thickness of the muscular wall. These are more particularly situated around the blood-vessels, or they may form islands more or less separated from one another. The second period is characterized by two changes: first, marked dilatation of the lymphatic spaces; second, localized hyperplasia around the blood-vessels. We may find it difficult to determine whether the muscular tissue remains normal, or is present in decreased quantity. Fritsch examined uteri removed for cancer, and found associated evidences of chronic metritis, in which the following pathologic changes were noticed: The arrangement of the muscular fiber and connective tissue is less regular than in the normal, and the latter is greatly increased in quantity. Blood-vessels are more numerous and tortuous. The vessel lumen is contracted, its tunica media is thickened, and the contour of the vessel is masked by the degeneration of the connective tissue in its wall. The lymphatic spaces, instead of being narrow clefts, are gaping; the peritoneum is thickened. Both Corneuil and Snow-Beck described an increased number of round and oval globules with amorphous tissue in the uterine walls. The increase in the size of the organ is due to the presence of this rather than to the increase of muscle-fiber.

371. **Etiology.**—The causes of chronic metritis are divided into two classes: (*a*) Those which operate by interference with the normal involution of the puerperal uterus; (*b*) those which are due to the production of repeated or protracted congestion. The first class comprises: first, retentions within the uterus of portions of placenta, membranes, or blood-clots; second, cervical lacerations; third, pelvic inflammations subsequent to labor; fourth, too short convalescence following delivery; fifth, nonlactation; sixth,

repeated miscarriages. Two factors are essential to the accomplishment of involution: first, fatty degeneration of the muscle-fiber; second, removal of the products of degeneration. Now, subinvolution or failure of the uterus to undergo complete involution is due not to want of degeneration of muscle-fiber, but to substitution of connective tissue for the products of this degeneration. Metritis, then, is generally found in women who have borne children, and it has been discovered that involution is retarded by the removal of the ovary. Any irritation in or about the uterus will cause a chronic metritis, and this explains the effect of retention of portions of the placenta or membranes, of lacerations of the cervix, and of the existence of peritonitis or cellulitis, as these conditions interfere with the circulation, which is also affected by premature getting up following labor. The organ is heavy, and the increased weight leads to its being displaced to a lower level, producing passive congestion. Passive congestion is decreased by any cause which increases uterine contractions; the physiologic stimulus of nursing excites contraction reflexly through the mammæ and favors involution. Abortions are especially instrumental, for the reason that the patients do not take so much care of themselves as they would subsequent to a labor, and the stimulus of lactation is absent. After an abortion conception is likely to occur before the process of involution is complete, and this favors the recurrence of abortion.

The second class of cases, which operate through production of repeated or protracted congestion, includes displacements of the uterus, the presence of tumors in or near it, and causes that produce increased flow of blood to the uterus, such as endometritis and the free use of caustics. To this class also belong malformation, incomplete development, congenital anteflexion, conic cervix, stenosis of os, improper clothing, exposure to cold, and masturbation. Metritis is favored by each menstrual period, by exposure to cold, especially when the uterus is displaced or the cervix is contracted or lacerated, by excessive copulation or its practice during menstruation, and by gonorrheal infection from an incompletely cured husband.

Chronic contusions from the use of a pessary may engender the inflammation. The intra-uterine stem-pessary is capable of doing the most injury.

Micro-organisms.—That consideration of the causes of chronic metritis must be incomplete which does not afford a survey of the etiologic influence of bacteria. The often stagnating secretion at the blood temperature, with the opportunity for the entrance of germs in the mature woman, renders conditions favorable for their multiplication. Under normal conditions the cervix and the uterine cavity are germ-free (Menge, Walthard). The introduction of pathogenic germs, with simultaneous traumatism, results in abnormal development. The germs that are prone to injure the uterus are:

1. Septic and saprophytic.
2. Gonorrheal.
3. Tubercular.
4. Diphtheric.

372. **Symptoms.**—In the large majority of cases the patient will date her trouble from a confinement. Not infrequently she will report repeated abortions, and that she subsequently regained her health very slowly.

The symptoms are not characteristic, but are similar to those found in cancer, fibroma, displacements, and other local disorders. They are: weakness; pain or aching over the lower lumbar and sacral regions; a sensation of weight and bearing down, as if the pelvic organs were to be extruded; an apparent loss of power in the limbs; points of anesthesia over the anterior surface of one or both thighs; painful contractions of the uterus; irritable bladder; constipation; loss of all pleasurable sensation during the sexual relation; pricking pain in the eyes and weak sight; photophobia; occipital pain, but more frequently pain over the coronal suture; and disturbances of menstruation, as dysmenorrhea, abnormal bleeding, menorrhagia, or metrorrhagia. In weak patients are found amenorrhea, leukorrhea, hydrorrhea, hydrorrhœa gravidarum, puerperal hydrorrhea associated with retention of portions of placenta and clots. Not infrequently there is loss of appetite, nausea, dyspepsia, and enfeebled assimilation. The patient is pale, anemic, and exceedingly weak, with dark circles beneath her eyes. She suffers from palpitation and a sense of oppression, and is exceedingly despondent, and profoundly melancholic. Acute mania, epilepsy, hysteria, and neurasthenia are occasionally induced, and are always aggravated by the existence of chronic metritis. The diseased condition under discussion is responsible for the majority of cases of semi-invalidism. The patient is continuously conscious that she has a uterus; the distress is increased by exercise and lessened by rest. The constipation and digestive disturbances are aggravated and increased by dread of pain and by her sedentary habits. The patient can suffer from acute exacerbations, with diarrhea and rectal tenesmus, as a result of extension of the inflammation to the rectum.

Menstrual disturbances are common, largely induced by the accompanying endometritis, called, from the bleeding, hemorrhagic endometritis.

The hemorrhage is probably quite as often due to the diminished contractile power of the organ, from the substitution of connective tissue for the muscle-fiber. The associated disease of the mucous membrane adds to the dysmenorrhea, which may precede, be simultaneous with, or follow the period. It is generally continuous with the period, in the form of increased backache, pressure, and pelvic discomfort.

Leukorrhea is produced by alterations of the uterine mucous membrane. In the aged not infrequently a hydrorrhea develops, with a periodic discharge so offensive as to lead to the suspicion of the development of malignant disease.

Sterility is a natural consequence of the prolonged existence of chronic inflammation, not only from alterations in the structure of the wall and mucosa, but probably much more from the superadded changes in the pelvic peritoneum, affecting the tube and ovaries. The escape of the ovum may be prevented by extensive adhesions fixing the ovary, or through thickening of the ovarian tunica albuginea, which prevents its rupture by the maturing Graafian follicle. The Fallopian tube may furnish the obstacle, through closure of its abdominal or uterine end, or by stricture along its course.

In the earlier stages of the inflammation the susceptibility to pregnancy may be engendered by the conditions, while the existing changes unfit its internal surface for the complete nutrition of the developing embryo, and abortion or premature discharge of the uterine contents follows. The substitution of connective for the muscular tissue, through the consequent uterine inertia, when gestation is completed, renders delivery tedious and increases the danger of postpartum bleeding.

Chronic metritis is responsible for a large proportion of the sofa and bath-chair population—the nervous, debilitated, dyspeptic women who wander from physician to physician or crowd the watering-places during the summer. The condition is frequently unrecognized and untreated, and the patient is condemned to suffer deeper and deeper wretchedness.

373. **Physical Signs and Diagnosis.**—The uterus is large, without a change in shape. The walls are firm and rigid, in later stages almost as resistant as a fibroid tumor.

The organ may have a normal position, may be situated at a lower level, or may be displaced. It may be freely movable or more or less fixed; readily outlined or fixed in a mass of pelvic exudate. The organ is sensitive to pressure.

Differential Diagnosis.—Pregnancy in the early stages presents a history of cessation of menstruation and of increased discharge. The uterus is enlarged, the cervix soft, while the body bulges like a jug, and is not resistant. Cancer usually involves the cervix, though the body may be the site of origin. In the latter the bimanual examination will show points of increased resistance. Bleeding results from severe manipulation, and an offensive, thin, and serous discharge will probably be present. Pain is a frequent symptom, and occurs most severely toward evening. The use of the curet or digital exploration after dilatation with tents may be required to insure the diagnosis. The cureted tissue in cancer will be friable from infiltration, exhibiting under the microscope the characteristic cellular structure.

Small fibroids are frequently difficult to recognize, especially when interstitial or submucous. The irregular enlargement, well-defined points of resistance, and frequently intermittent pain are diagnostic. Digital exploration of the uterine cavity determines the presence, size, and situation of the growth. Salpingitis is often associated with metritis, when it may be difficult to determine which predominates. A small ovarian tumor may be the cause of hemorrhage.

Rectal disease may produce symptoms simulating chronic metritis. The general health may be so affected as to cause the local manifestations to be overlooked. Thus, the patient may complain of persistent cough, difficult breathing, or progressive emaciation, or the stomach may be the source of trouble, causing loss of appetite, flatulence, and gurgling, and presenting evidences of dilatation. She may have precordial anxiety, palpitation, or cardiac and vascular murmurs.

It is a good rule to make a careful uterine examination in all cases of chronic disease.

374. **Course and Prognosis.**—Metritis in all forms is obstinate and rebellious. The mucous membrane, muscular wall, and serous covering in turn are affected, followed by uterine sclerosis, cyst formation, and, finally, chronic metritis. In alterations of structure we can not hope to cure in the sense of restoration of altered tissues; we can hope for arrest of the process, relief of congestion, and amelioration of unpleasant symptoms.

375. **Treatment.**—The best treatment is preventive. It consists in thoroughly emptying the cavity of the uterus after labor; in early repair of lacerations; in the relief of inflammatory conditions existing about the uterus; in stimulating involution of the organ by hot vaginal douches; in the administration of ergot and of remedies that will facilitate the contraction of its muscle-fibers; in the exercise of such measures as will diminish congestion; in preventing the patient from rising too early from bed after pregnancy or abortion, and, when the condition subsequently exists, obliging her to remain in bed several hours daily, and to

avoid sedentary occupations and long standing. While it is important that the patient should have sufficient rest, it is equally desirable that this should not be excessive. A certain amount of exercise in the open air is as desirable as rest. Tight clothing should be excluded. If the abdominal muscles, however, are very much relaxed, a snugly fitting abdominal binder affords great comfort and relief. This relaxation of the abdominal muscles is not infrequently associated with relaxation of the vaginal walls, when the use of a ring-pessary gives comfort. The circulation of the pelvis should be stimulated by vaginal douches of either hot or cold water. The latter are more stimulating, but few patients can employ them. Patients should take a hot douche, at a temperature of from 103° F. to 120° F., for ten or fifteen minutes before retiring. These douches are more effective when the patient is in the recumbent position. She can lie across the bed with her pelvis upon a basin or rubber pad, which shall drain into a pail below, while her feet rest on chairs. A douche bag, containing at least three pints, should be placed three feet above the level of the patient. Prior to its use the vulva and perineum should be coated with vaselin, to protect from the heat. The tube should be introduced to the cervix, and from three to ten pints of fluid should be used with each douche. Occasionally, warm baths should be used simultaneously with the vaginal douche. A cold hip-bath in the morning will be of great service. Medicated baths and waters are often of value. In catarrh or in scrofulous and chlorotic patients iron waters are beneficial. In nervous patients the character of the water is unimportant, but the patient should be encouraged to take large quantities. With dyspeptics, alkaline waters are desirable. In the lymphatic and scrofulous cases waters impregnated with chlorid of sodium are very efficient. These are also of value in some forms of chronic metritis where engorgement of the uterine body predominates. Patients not infrequently derive great advantage from change of air or scene, new surroundings, new relations, or a visit to the seashore or country. Constipation should be combated, preferably with foods, such as vegetables, Graham bread, and prunes; often effectively with other agents, as a teaspoonful of white mustard in water at meals; enemata to which glycerin is added; the administration of mineral waters—the Friederickshall water, Carlsbad salts, or Hunyadi Janos. The Carlsbad salts are of particular value in bilious patients. A teaspoonful should be dissolved in a glass of water and drunk in repeated sips during the morning. Friederickschall and Hunyadi act best when mixed with equal quantities of hot water. A good mixture is a tablespoonful of the following preparation:

a higher level and improves its circulation, while, medicated with glycerin, it has a depletive or cholagog effect upon the vessels of the cervix, causing a profuse watery discharge. The patient may be instructed how to introduce these tampons, and may use them daily. A tampon saturated with a 50 per cent. solution of boroglycerid in glycerin, a 10 to 20 per cent. solution of ichthyol in glycerin, or carbolic acid (1 : 16) may be kept in place for one to two days. A tampon anointed with one part of ichthyol to four of lanolin is valuable when more or less irritation of the vagina is associated with the uterine lesion. In laceration of the cervix, where it has subsequently become hypertrophied, Emmet's operation is of service in relieving the congestion and promoting involution of the organ. If the cervical mucous membrane is much everted, with papillary projections and eroded surfaces, amputation of the cervix by the single-flap method advocated by Schroeder (Section 287) will be more effective. Any disturbances of menstruation, such as dysmenorrhea and menorrhagia, should receive treatment suitable for endometritis. (Section 359.) For this condition, as well as for the chronic metritis, dilatation and curetage of the uterus is of value. The dilatation is preferably done with Pratt's dilators, as these instruments gradually stretch the uterine canal without danger of tearing, unless the dilatation is excessive, which may occur in the use of the parallel bar dilators.

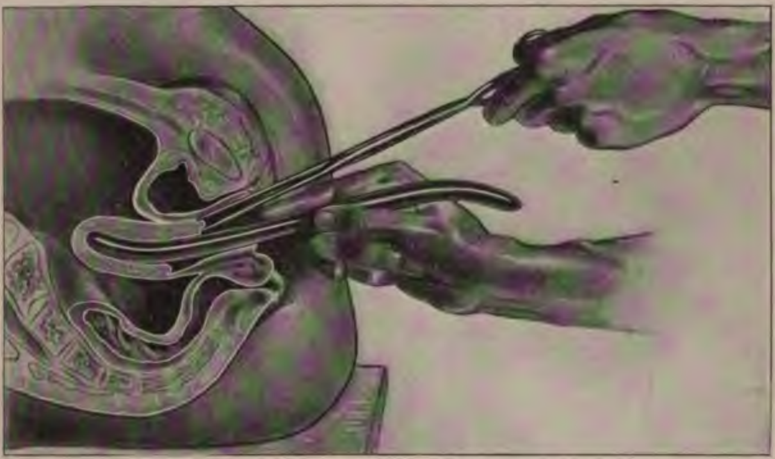

Fig. 291.—Dilatation of the Uterus with Graduated Bougies.

After preparation of the patient (Section 118) she is placed upon her back, the uterus is exposed by the Edebohls speculum, the cervix is seized and fixed with a double tenaculum, and the bougies are introduced, thus gradually dilating the cervical canal. The dilatation is followed by the use of the curet. This instrument may be blunt or sharp; the latter is preferable, if carefully used. The handle of the instrument should be perforated, so that the surfaces can be irrigated as the cureting is done. The instrument is held lightly, between the thumb and finger, and is passed into the uterus and drawn down on all sides of the organ in long sweeps, paying particular attention to the angles of the body and to the orifices of the Fallopian tubes. The use of the curet in this manner does not remove the entire mucous membrane; even though it did, the mucous membrane would be regenerated from the portion of the glandular structure which penetrates the muscular wall. The curetage may be followed by swabbing out the cavity of the uterus with tincture of iodin, with a combination of tincture of iodin and carbolic acid, or with perchlorid of iron. When any of these agents are used, the irrigator should be introduced, again washing out the cavity of the organ, thus removing any clots and superfluous medicine. If the discharge of blood is slight, the uterine cavity need not be packed. If there is considerable discharge, it should preferably be packed

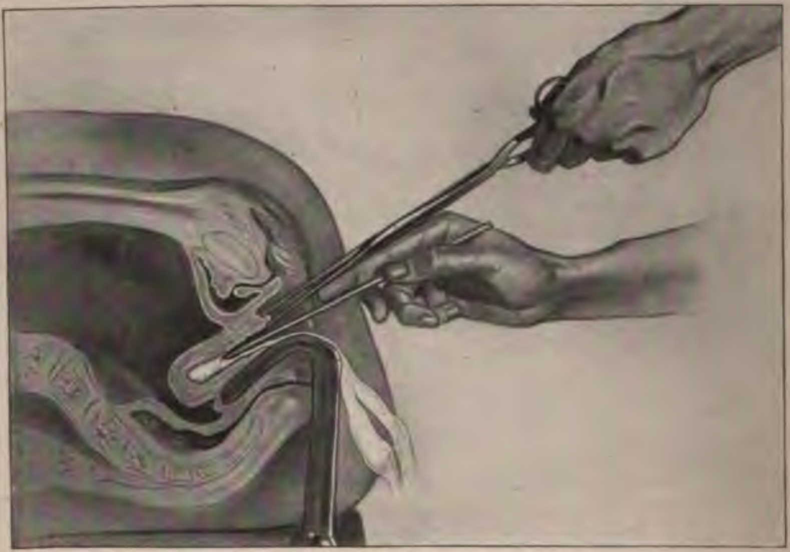

Fig. 292.—Uterine Cavity Packed with Gauze after Dilatation.

with iodoform gauze. Gauze packing is serviceable in that it first acts as a tampon, decreasing the danger of bleeding or of the formation of a clot of blood, which might become infected and give rise to extension of inflammation to surrounding structures. Second, by its pressure upon the surface it favors the throwing-out of exudation and shuts off the entrance of septic material into the uterine sinuses; third, by its capillary action it affords a limited amount of drainage; fourth, by its presence as a foreign body it stimulates uterine contraction and facilitates the process of involution. The vagina is carefully cleansed and a gauze pad placed within it, raising up the uterus. This gauze dressing may be permitted to remain two or three days. After its removal the vagina should be irrigated once or twice daily with a bichlorid or formalin solution. When the uterine cavity has been the seat of extensive inflammation, with a predisposition to hemorrhage, the removal of the gauze may be subsequently followed by uterine irrigation through a double-current catheter. In hydrorrhea or pyometra in the aged it is very important to make sure that drainage is complete. The accumulation of fluid within the uterine cavity results in the formation of a sac of this organ, the contents of which may become infected and produce an occasional profuse discharge, which may cause the greatest alarm on the part of the patient. Drainage in such cases should be insured; when necessary, by the introduction of a drainage-tube, through which the cavity is well irrigated and cleansed. Remedies should be applied to the uterine cavity which will establish a healthy inflammation and arrest the abnormal accumulation. When the uterus is displaced, associated with hydrometra or pyometra which a pessary fails to correct, the advisability of extirpation of the uterus should be considered, if the woman has passed the climacteric. Uterine adhesions or peri-uterine inflammation need not necessarily contraindicate curetage, as not infrequently the increased drainage thus secured will result in the relief of the peri-uterine disease. In patients who have suffered for a great length of time, who have become exceedingly nervous, hysteric, with general health destroyed, suffering from delusions or illusions, exceedingly irritable temper, a source of worry and distress to the family and to themselves, no better plan of treatment can be instituted than that advocated by Weir Mitchell as proper for neurasthenic patients. This treatment consists in placing the patient in bed; at first upon a distinct milk diet, with careful regulation of the bowels, correction of disordered condition of the alimentary canal; and, later, forced feeding, with as large a quantity of food as the patient can properly digest. She is under the control of a discreet, careful nurse, who allows her to take no exercise nor even to move without assistance. In place of exercise she is given, once daily, thorough massage, thus carrying forward the blood-current, stimulating the absorption of waste material, and causing the introduction into the uttermost parts of the body of blood containing oxygen. The anemia which characterizes such patients is thus rapidly overcome, the number of red blood-corpuscles greatly increases, while the elimination of waste material is promoted. Once a day she is given an application of the faradic current—general faradization. She is isolated from the members of her family, and during this period of isolation is brought under careful mental discipline, which aims to stimulate her ambition, to overcome the condition by which she has become subjected, so that by the end of six weeks or two months the patient undergoes a complete physical and mental change.

376. **Pelvic Inflammation.**—The term pelvic inflammation is a comprehensive one. It is necessary, at the outset, to limit it to the conditions which we intend it shall include. Inflammation of the individual pelvic viscera has been or will be discussed, so this term will be confined to inflammation which involves the cellular tissue and the peritoneum. It consequently includes those affections described as pelvic cellulitis and pelvic peritonitis.

These conditions have been designated as peri-uterine inflammation; by some writers of distinction, notably Virchow and Matthews-Duncan, the terms parametritis and perimetritis have been used—the former to indicate inflammation of the cellular tissue; the latter, of the peritoneum. The latter terms are objectionable for the following reasons: First, they are so nearly alike that it is difficult for the student to avoid confusion in their use, and the subject is rendered more difficult of comprehension. Second, a difference in the anatomic relations of the peritoneum and cellular tissue to the uterus is implied which does not exist. The pelvic connective tissue and the pelvic peritoneum are in equally close contact with the uterus. It is distinctly objectionable, therefore, to consider one as an inflammation about the uterus and the other as an inflammation near it. Third, the conditions are described as associated with the uterus, while they may exist in all the tissues of the pelvis, and are not necessarily uterine in their origin.

Careful investigation of the pathology of these conditions by autopsy, and their more extended study during abdominal procedures while in active stages of disease, have demonstrated how easily such erroneous views could arise.

Bernutz and Aran, of France, many years ago demonstrated the true nature of the condition, which has been abundantly confirmed by the practice of abdominal surgery, through the opportunity afforded to compare physical signs with the actual existing pathologic changes.

377. **Varieties.**—Pelvic inflammation as we have described it is properly divided into inflammation of the cellular tissue (pelvic cellulitis) and inflammation of the peritoneum (pelvic peritonitis). It must not be understood in these definitions that the demarcation between these affections is sharply defined, for, in practice, we do not find inflammation confined to the single or specific structure. Their use indicates simply that the inflammation predominates in the structure named.

378. **Pelvic cellulitis, parametritis,** or **peri-uterine phlegmon,** is an inflammation of the pelvic cellular tissue. It may be either primary or secondary: *i. e.*, it may have originated in the cellular tissue or may have reached it by extension from the neighboring structures. The primary inflammation is an acute infective disease which differs in no respect from acute inflammation of the connective tissue in any other portion of the body. Chronic pelvic cellulitis is always a secondary affection; never the result of acute cellulitis. The pelvic connective tissue is not a special structure, but a portion of that wide system of mesoblastic connective tissue which surrounds the great vessels of the trunk and accompanies their branches from origin to termination. It is found in the pelvis, partly in the form of a loose areolar network, partly in the more condensed form of fascia. It surrounds all the blood-vessels, nerves, and lymphatics, as well as the ureters, and serves as investing sheaths for them outside the pelvic cavity. It is closed off from the perineum and ischiorectal fossa by the pelvic fascia, a strong aponeurosis, which is attached to the pelvic wall between the pubic bones, and bodies of the ischia, and along that thickening of the obturator fascia known as the white line. It passes as a continuous layer over the levator ani and coccygeus muscles to the vagina in front, and to the rectum and coccyx behind. It closely blends with the vaginal orifice, behind the pubic symphysis, as the triangular ligament. Inflammatory exudations of the female genital organs above the vulva are situated above this strong fascia. The cellular area with such a boundary below has the peritoneum for its superior limitation. This boundary, however, is less abrupt, as it is continuous with the subserous connective tissue of the parietal peritoneum of the abdomen. With the exception of the fundus of the uterus, it forms a layer beneath the entire pelvic peritoneum—both parietal and visceral. The so-called uterine ligaments contain more or less of it between their peritoneal folds, and in certain situa-

tions it is abundant. For instance, around the supravaginal portion of the cervix, and along the base of the broad ligaments and between the bladder and symphysis pubis. In the latter situation it contains a varying quantity of fat in its meshes.

Its office in the pelvis, as elsewhere, is to protect and support the other tissues, performing a passive mechanical function. It affords a cushion which prevents injury of the viscera (Schaefer). The connective-tissue layer, between the vagina and peritoneum posterior to the uterus, generally does not measure more than $\frac{1}{3}$ of an inch in thickness, but in pregnancy its thickness is greatly increased. During the progress of development of a pregnant uterus the broad ligaments are gradually drawn upward, until at the completion of the pregnancy they lie in the iliac fossa, above the brim of the pelvis, while no peritoneum dips into the lateral parts of the pelvis. The space thus vacated is filled with connective tissue, which during the later months of pregnancy is enormously increased. Freund describes a form of cellulitis which affects more particularly the fatless connective tissue, or fascia, which he calls parametritis chronica atrophicans circumscriptum et diffusum. Cellulitis is a very common complication of pelvic peritonitis involving particularly the uterosacral ligaments and peritoneal folds. Schultze calls this parametritis posterior: uterosacral cellulitis is more accurate. Cicatrization of the ligaments following such inflammation causes traction upon the isthmus, and is a very common cause of dysmenorrhea and sterility. As a result of the contraction of the tissues, the uterus may be anteflexed and drawn to one side or backward, thus producing a pathologic anteflexion. By compression of the vessels and nerves the uterus and ovaries may become atrophied. Cellulitis may exist with or without suppuration. When suppuration does not occur, an exudation results in the connective tissue, which becomes edematous, and subsequently more or less organized, firm, and hard, causing pressure upon the vessels and nerves which pass through it. The changes in this structure are similar to those which take place in cirrhosis of the liver or of the kidney.

379. **Etiology.**—Primary pelvic cellulitis is said to be always a result of sepsis. Ready entrance for septic material is afforded through lacerations of the cervix uteri. These injuries may result from the use of forceps, and, if kept aseptic, readily heal. In the nullipara cellulitis may arise from the same causes as the pelvic peritonitis, such as exposure to cold during menstruation, being then generally associated with pelvic peritonitis, and from surgical operations which open the connective tissue, as in the removal of large uterine polypi, affording an opportunity for

cellulitic infection. The danger is especially great when the growths are expelled or removed while in a state of necrosis. A certain amount of lymphangitis is then associated, with which the lymphatic glands may be implicated, or it may develop from diseases in the bladder. As a result of such irritation thickening occurs in the connective tissue outside the bladder, which thickening passes outward and forward, and in ultimate atrophy may cause uterine displacement in the opposite direction. From the rectum, the causative irritation may be dysenteric. Pelvic cellulitic abscess is not infrequently so situated as to render it more than probable that the hypogastric glands are involved. Inflammation of the cellular tissue is much more rare than that of the pelvic peritoneum. When suppuration occurs, an abscess results. This is generally a large abscess cavity; occasionally, several abscesses may be found in close apposition.

380. **Symptoms.**—In puerperal cases the cellulitis is generally ushered in about the second or third day, with a rigor or chill, although it may take place later. In nonpuerperal cases the interval between infection and the first manifestation of symptoms is rarely more than one or two days. The occurrence of the chill has produced the belief that the inflammation arises from exposure to cold; simultaneously with the chill occurs an elevation of temperature, a rapid pulse, but rarely pain, unless the peritoneum is involved. With the occurrence of suppuration the most marked symptom is the progressive emaciation, with pallor or an earthy sallowness of the skin. The skin becomes harsh, dry, and covered with branny scales from the fine desquamation. The patient looks ill, loses her appetite, and suffers from marked debility and severe mental depression. She becomes very irritable. If the exudation extends to the fascia over the iliacus and psoas muscles, and particularly if the connective-tissue elements between these muscles are involved, the patient will lie upon her back with the leg of the affected side flexed and the thigh bent upon the trunk. The symptoms are those of a subacute form of septicemia. Pain and local signs may be so slightly marked as to lead to the condition being unsuspected or overlooked.

381. **Physical Signs.**—In the early stage of the acute attack the physical signs are but slightly marked. All that will be noticed by digital examination is that the vagina is hot and its vessels are pulsating. In a few hours there are indications of an inflammatory exudate. There is a doughy sensation and fullness on one side of the uterus and in the iliac fossa. This may extend partly around the cervix, and subsequently becomes hard and indurated. If the poison has entered through the wound

rectum will be felt wholly or partly surrounded by a belt of exudation, which forms a bridge or an arch. If suppuration does not occur, the exudation becomes absorbed, and in uncomplicated cases the hardness may so far disappear as to leave no subsequent trace. In not a few cases pelvic cellulitis results, in the form of an abscess. The situation of the abscess and the direction in which it may be expected to extend depend upon the situation and the extent of the inflammatory exudation. If the inflammation is seated in the base of the broad ligament and passes forward beneath the peritoneum, where it is reflected on to the anterior abdominal wall, an area of induration may be noticed above Poupart's ligament. Suppuration can be recognized by the occurrence over the indurated area of edema in the skin, which pits on pressure; by deep-seated fluctuation, especially recognized by bimanual examination; and by the eventual pointing of the abscess a little above Poupart's ligament. The pus can often be detected before it reaches the surface by passing

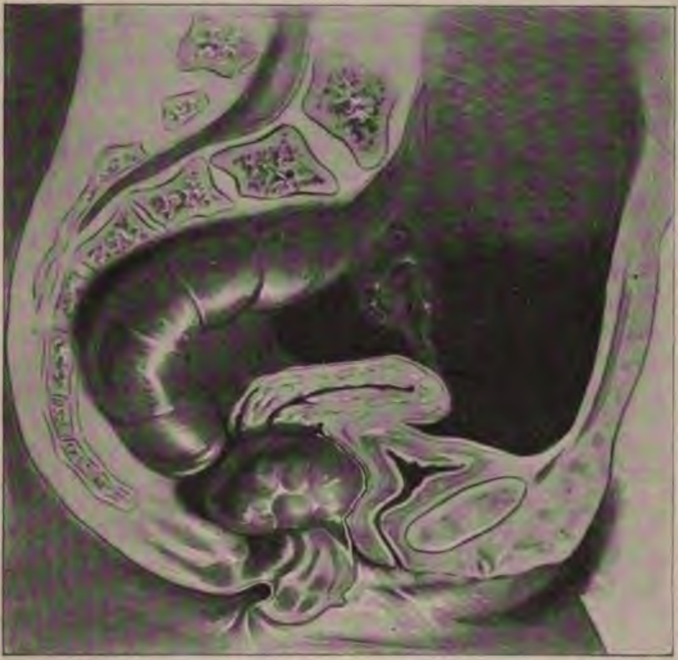

Fig. 294.—Exudation of Pelvic Cellulitis Alongside the Rectum.

situated to one side of the cervix or may extend along the base of the broad ligament of the affected side. The lateral fornix of the vagina will be completely obliterated. When the inflammation extends backward, vaginal examination of the posterior wall will reveal a diffuse fullness, and hardness on the affected side, which is still further demonstrated by rectal examination. In the rare cases in which the broad ligament itself is affected the diagnosis is determined by finding the mobility of the body of the uterus impaired, and a more or less flattened mass of induration upon one side, which is continuous with the uterus. Excepting the plane of tissue between the cervix uteri and the bladder, the cellular area of one side of the pelvis is practically shut off from that of the other. Hence, we find pelvic cellulitis is for the most part unilateral. Differential diagnosis for pelvic peritonitis will be discussed later. (See Peritonitis.) The only other conditions with which cellulitis can be confounded are hematoma of the broad ligament and myoma of the uterus. In hematoma there is an effusion of blood into the connective tissue, which forms a slightly movable, somewhat flattened tumor alongside of and continuous with the uterus. The history of the case and the absence of symptoms of severe illness will generally serve to distinguish it. It occurs suddenly, from rupture of a pregnant tube or of a varicose vein in the broad ligament. In either case the onset is marked by violent pain, faintness, syncope, and usually vomiting. In pregnancy of the tube one or two menstrual periods will have been passed, and the pain will be situated in the lower part of the abdomen, generally on one side, with irregular uterine bleeding. The effect of such an outpouring of blood upon the temperature and pulse is transient. The temperature is not elevated. If infection occurs, suppuration results, and the symptoms then are similar to those of pelvic abscess from cellulitis. Myoma can rarely be mistaken for cellulitis. Only in those rare cases in which the myoma develops laterally between the layers of the broad ligament and forms a more or less hard tumor directly continuous with it is error possible. Should the myoma be complicated by a localized peritonitis, or the tumor become inflamed or gangrenous, the diagnosis may be difficult. In the posterior wall error is scarcely probable, for large inflammatory exudations into the connective tissue behind the uterus are extremely rare. In the anterior wall the signs of cellulitic exudation between the bladder and the upper part of the cervix are well marked and characteristic.

383. **Prognosis.**—The disease usually terminates in recovery, except in the very diffuse variety, in which it is a part of a general septic process. With the subsidence of the fever the exudation

is gradually absorbed, and under favorable circumstances entirely disappears in a few weeks. Cellulitis uncomplicated by peritonitis leaves no unpleasant results, no adhesions nor displacements. Its existence, consequently, is no bar to subsequent pregnancy. If fever continues longer than five or six weeks, suppuration has probably resulted. The duration and progress of the illness will largely depend upon the direction the pus takes. Generally it points above Poupart's ligament, where it can be easily and satisfactorily opened. Such cases invariably do well. In the rare cases when it occurs at the back of the pelvis, pus is longer in reaching the surface, and may burrow in different directions. Such cases often last a long time, and are likely to be complicated by extension to the peritoneum. When resolution and the absorption of the inflammatory processes are slow, the exudate can become organized, and cause cicatricial contraction and resulting displacement of the uterus. Such contractions also lead to atrophy of the uterus and ovaries. The obstruction of the circulation produces localized congestion, and even inflammation, and causes disturbances of menstruation, such as menorrhagia and dysmenorrhea, and sterility. It is necessary, then, to be guarded in our promises of complete recovery.

384. **Treatment.**—A description of the disease and of its causes emphasizes the importance of preventive treatment. This should consist in careful attention to the principles of asepsis or surgical cleanliness in all midwifery cases and in surgical manipulations. If freedom from infection could be insured, pelvic cellulitis would disappear. When the disease is once developed, medication, either internal or external, has but little influence. It is of the greatest importance to avoid doing the patient harm. Particular care should be exercised in the administration of opium and antipyretics. The former agent is generally given as a matter of routine. It results in further disturbance of the already obstructed digestive functions and aggravates one of the difficulties which it is important to obviate: viz., constipation. Opium or morphin should be given only in cases complicated by peritonitis, in which it is absolutely necessary to afford relief. Similarly, antipyretics should be reserved for the rare occasions when the temperature is so high as to constitute in itself a source of danger. A simple saline mixture, potassium citrate, or small, frequently repeated doses of magnesium sulphate should be given until the bowels are freely evacuated. Care should be exercised to avoid fecal accumulation. The question of feeding is of equal importance: farinaceous diet in the acute stages, with meat, eggs, and easily digested food in the later period of the disease. The tendency to emaciation calls for generous feeding. In the early

stages of the inflammation an ice-bag over the abdomen will limit the congestion and the amount of inflammatory exudate. When the ice-bag is uncomfortable or causes distress, hot fomentations should be applied. Hot vaginal douches, at a temperature of from 110° F. to 115° F., are advocated by Emmet, although the influence they exert is doubtful. When pus forms, the case should be dealt with according to recognized surgical principles. The abscess should be opened as soon as fluctuation is detected or there is the faintest indication of pointing, and the drainage-tube should be inserted for a few days. If the abscess points in the vagina, it must be opened there. Most of the fluctuating swellings felt through the vaginal roof are not cellulitic abscesses, but come from an entirely different direction. While it is not generally recognized as the proper plan of treatment, yet, without question, the course of an abscess can be shortened by making an incision in the infected cellular tissue through the vagina as early as the swelling about the uterus can be recognized. Breaking into the infected area, tearing up with the finger, and the introduction of a gauze drain which will afford vent for the discharge will frequently obviate the occurrence and danger of suppuration and prevent the extension of inflammation to the pelvic peritoneum. If the patient lies with the thigh flexed on the body, the limb should be exercised by lifting the foot with the hand under the heel two or three times a day sufficiently to straighten the knee. This will prevent permanent contraction and stiffening of the joint.

As has already been mentioned, chronic pelvic cellulitis does not exist as an independent affection or as a sequel of the acute disease. It not infrequently occurs secondary to purulent salpingitis or other intrapelvic suppurative inflammation, and involves only the parts immediately contiguous to the inflamed structures. The induration, to which it gives rise for a time, of course introduces an element of obscurity into the diagnosis of deep-seated inflammatory lesions of the pelvis. It is rarely attended with cellulitic abscess, and is characterized chiefly by edema and small-cell infiltration of the connective tissue. Its absorption and the mobility of the uterus may be promoted by the practice of pelvic massage. (Section 169.) When cellulitis has existed sufficiently long to result in atrophy of the uterus or ovary, treatment exerts but little effect.

385. **Pelvic peritonitis, perimetritis, perisalpingitis, or perioophoritis,** is an inflammation of the peritoneum situated within the pelvis. It occurs much more frequently than pelvic cellulitis; indeed, more frequently than any other form of inflammatory disease within the pelvis. In the great majority of cases it is an

infective process, due either to the presence of micro-organisms or to the effect of their chemic products. In the main its action may be regarded as beneficial, it being one of nature's efforts to resist or to do battle with the invading foe by erecting barriers around the diseased area. These barriers serve to narrow or to confine the field of invasion, and shield the neighboring structures from damage. Treves asserts that the purpose of peritonitis is to save and not to destroy life. Unfortunately, the poison may be so virulent or may exist in so large a quantity that we are unable to limit or to guide the inflammatory process to a successful issue.

386. Etiology.—Pelvic peritonitis probably never occurs as a primary disease, but always as a complication of a preexisting disorder. Occasionally, however, it is the first recognized expression of such disease. The symptoms of peritonitis are so severe that attention is at once aroused, while the condition from which it originated may have been so insidious as to have been overlooked. From want of knowledge, then, of the previous condition we are often compelled to ignore the causing condition, and to say that the patient suffers from pelvic peritonitis. Is it surprising that the original condition was formerly unrecognized and the disease denominated idiopathic peritonitis, the result of a slight injury or of exposure to cold? It is true there are still cases in which we are unable to discover the preexisting disease, but the number of such cases has become less and less frequent, and failure to determine the cause of pelvic peritonitis is the result of defective observation and of want of knowledge.

The most frequent cause is sepsis; next, gonorrheal infection. The micro-organisms principally concerned in the development of infection are the streptococcus, the staphylococcus, the gonococcus, and the bacillus coli communis. These septic micro-organisms are favored by parturition, abortion, instrumental examination, and surgical interference. Other causes are inflammations of the appendix, intestinal perforations, abdominal lesions, rupture of an ectopic gestation, hematocele, ovarian abscess, or hematoma, malignant disease, and tubercular disease.

Infection generally reaches the peritoneum in one of three ways: first, by the continuous mucous membrane through the uterine cavity and tubes; second, by the blood-vessels; third, by the lymphatics.

Tubal disease is the most common cause of pelvic peritonitis, and should receive first consideration. The mucous membrane of the Fallopian tube is continuous with that of the uterus, and at its abdominal end opens into the peritoneal cavity.

The continuity of the tubal mucous membrane with that of or ovary into the peritoneal cavity. Fortunately, such an occurrence is rare. The thinned wall of such a collection is a menace which places nature upon her guard and stimulates her to present adhesive barriers which limit the space into which the rupture occurs and favor the formation of an intraperitoneal abscess. Such an abscess may rapidly enlarge, and, if the patient survives, may burst into one of the neighboring viscera, into the peritoneal cavity, or externally, according to its situation. Suppuration of an ovarian cyst may be independent of infection through the tube; occasionally, it more than probably occurs from proximity of an inflamed growth to the rectum or intestine. The cyst is more vulnerable to such infection when it has been exposed to injury, or subjected to bruising, as in labor.

Peritonitis may be favored by twisting of the pedicle in an ovarian cyst. This accident can result in strangulation, intracystic hemorrhage, inflammation, or necrosis of the growth, according to the amount of strangulation. The accident is particularly prone to occur during parturition.

The presence of puerperal sepsis should be regarded as demanding careful investigation. New pelvic growths, by their mere presence, may engender peritonitis. This is common in ovarian tumor. The tumor varies greatly in the probability of its producing peritonitis. Uterine fibromata may attain a large size without adhesions unless degenerative processes set in, while a papilloma of the ovary or tube, dermoids, and malignant diseases are usually associated with extensive peritonitis.

Severe septicemia may follow abortion, parturition, or surgical manipulations, and, instead of being confined to the uterine mucous membrane, can at once be carried by blood-vessels or lymphatics to the peritoneum, and generate a diffuse septic infection of the pelvis. Such a peritonitis may become localized in the pelvis or may rapidly prove fatal by its extension to the general peritoneum.

Clinical experience has demonstrated that injury alone will cause peritonitis only when the hand or instrument inflicting the injury is surgically unclean. The truth of this assertion is illustrated by the infrequency with which extensive operative experience within the peritoneal cavity is followed by inflammation, and by the frequent attacks of virulent and fatal peritonitis following slight injuries in efforts to produce abortion. It is, without question, a mere problem of infection. The operator in the latter is usually ignorant or reckless.

Complications during parturition may cause peritonitis. The shape and size of the normal pelvis is adapted to the passage of the normally constructed child at full term, and is without extra accommodation. Any encroachment upon the pelvis by tumor, growth, or malformation affords an obstacle which renders passage through the canal possible only at the expense of injury or bruising, which may result in loss of vitality of tissue or growth, and thus render the structures more susceptible to the influence of pathogenic micro-organisms.

Pelvic cellulitis, it has been said, is generally secondary, but still it may precede the peritonitis. This is particularly true in suppuration.

Pelvic hematocele is a source of peritoneal inflammation. The irritation induced by the blood diffused into the peritoneal cavity causes exudation and adhesive peritonitis. The blood-serum may be roofed in beneath adherent omentum and coils of intestine, when the peritonitis limits effusion and promotes its subsequent absorption.

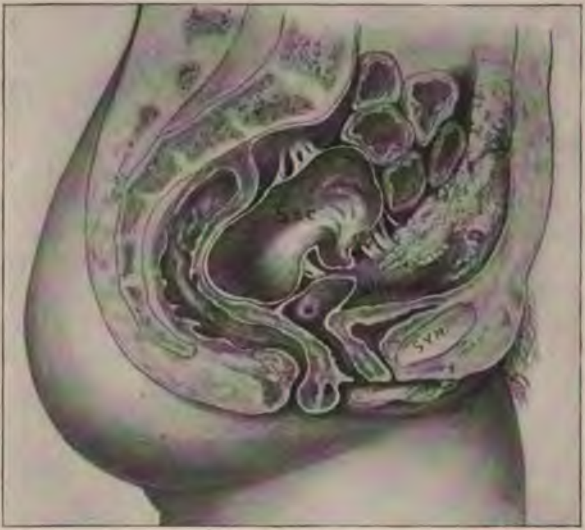

Fig. 295.—Extensive Pus Collections with General Adhesions.

Inflammation of the vermiform appendix, or appendicitis, is a not infrequent cause of pelvic peritonitis. Its normal situation is in the right inguinal region, just above the brim of the pelvis, but instances occur in which it has been found lying within the pelvis. In right-sided inflammation of the pelvic peritoneum it is always important to keep in mind the possibility of the appendix being the source of infection. An abscess formation may follow, which will fill up Douglas' pouch. In many cases it is difficult to determine whether the appendix or the right tube is the original source of infection.

387. Pathologic Anatomy.—Inflammation may be serous, adhesive, or suppurative, and acute or chronic. As it most frequently originates from infection through the tubes, the tubes and ovaries are implicated. It begins as a congestion or hyperemia of the serous surface, with cloudy swelling of the endothelium. The membrane, instead of being smooth and glistening, becomes dull, dry, clouded, and slightly roughened with plastic lymph, which is poured out between its adjacent surfaces. The adhesions thus produced are its most characteristic feature. In recurrent attacks we find additional adhesions. Serum exudation becomes encapsulated, is found in the meshes of the connective tissue, may fill the culdesac or pelvis, posterior to the uterus, or it may be encysted to one side. Such collections may simulate a cyst. When the exudation thrown out is considerable, it may form a distinct coating, which may be peeled from the surface of the peritoneum. These lymph coagula are also found floating in the serum, and, as the fluid becomes absorbed, this coating stiffens the peritoneum, and, with the induration in the subjacent cellular tissue, causes the hardness which is one of the striking characteristics of chronic pelvic peritonitis.

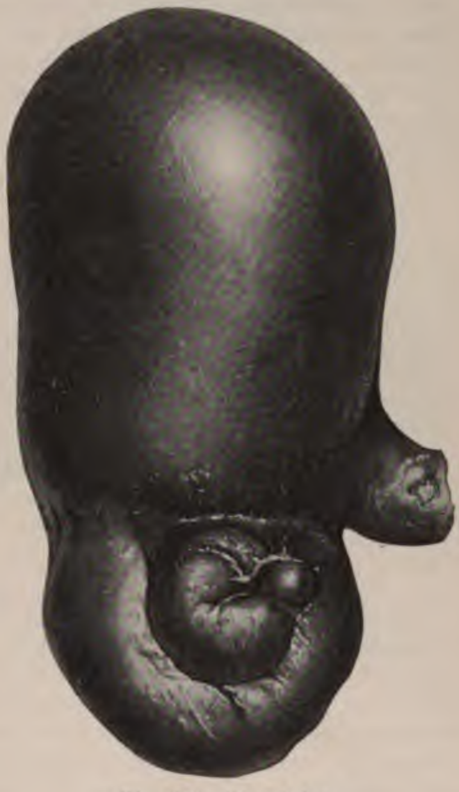

Fig. 296.—Pyosalpinx.

These indications of inflammation are usually most strongly marked about the fimbriated ends of the Fallopian tube, and diminish as they pass from it. When the inflammation has originated in some other cause, such as an inflamed appendix, the alteration and adhesions are most dense at the seat of origin. Thus, a Fallopian tube, when it becomes inflamed and increases in weight, drops from its original position, so that it is found upon the floor of the lateral fossa of the pelvis, in the pouch of Douglas, or adherent by its fimbriated end to the ovary or to the side of the pelvis. Occasionally, the two tubes meet, and the distal ends become adherent to each other behind the uterus. At other points the direction of the tube may differ in two sides of the body. One side is bent like a horseshoe, while the other terminates against the lateral wall of the pelvis, to which it is adherent by its abdominal end. If the uterus is lifted out of the pelvis by pregnancy, the tube may be found situated above the brim, close to the border of the psoas muscle. The ovary is generally found implicated in the mass of inflammation which has extended from the tube. When this inflammation has existed for some time, we frequently find the ovary in a cystic state, and considerably enlarged. These changes result from the effect of the surrounding peritonitis.

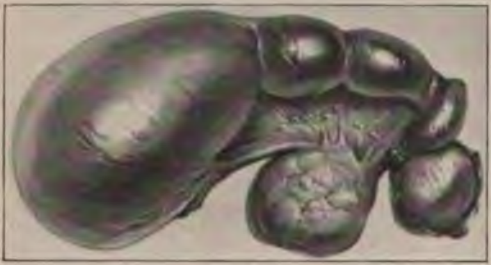
Fig. 297.—Hydrosalpinx.

In chronic cases the peritoneum, in places, is lifted up by circumscribed collections of serous fluid in its meshes. These swellings vary in size from a pea to a large orange. They possess no pathologic importance, but often increase the difficulty in arriving at an accurate diagnosis. A mass formed by an inflamed tube, ovary, and broad ligament not infrequently is found adherent to the posterior pelvic wall and the rectum. Sometimes a coil of intestine or a portion of omentum may intervene, when the parts are so entangled in an extensive mass of exudation as to cause great difficulty in outlining and determining their relations. The body of the uterus is enveloped in a mass of adhesions or is completely free. When the lesion from which the peritonitis has originated is purulent, peritonitis is also apt to be purulent, and, instead of an accumulation of serum, pus or intrapelvic abscesses are found. Occasionally, suppurative peritonitis exists. The latter occurs only in cases of exceptional virulence, or from sudden bursting into the peritoneal cavity of a pus collection which was situated in an ovary or tube. Intraperitoneal abscesses may be single or multiple. They generally originate by the rupture of a suppurating Fallopian tube, or by the discharge through its abdominal ostium of pus into Douglas' pouch or into a space bounded by adhesions. Both tubes may thus discharge into a common receptacle, which is most generally Douglas' pouch. A tense, fluctuating swelling is formed, easily felt through the depressed vaginal roof, which, by pressure against the intestine, causes more or less obstruction. Purulent inflammation of the tube early leads to closure of the abdominal ostium, when the pus is confined within the tube, and forms what is known as a pyosalpinx. An intraperitoneal abscess or general peritoneal infection may then be induced by infection through the tubal wall, or by the bursting of the pyosalpinx from ulceration within, or by the spread of infective processes to the ovary, causing it to suppurate.

An intraperitoneal abscess walled in by adherent viscera may run an acute course or may be retained for a length of time, giving rise to few, if any, indications of its presence. One of two things is likely to occur, however: either the abscess gradually dries up and disappears, or its walls undergo ulceration and its contents escape into the bowel—usually the rectum, sigmoid flexure, or colon—or into the vagina, the bladder, the general cavity of the peritoneum, or some part of the abdominal wall. The most frequent exit is through the intestine. The other routes are exceptional. Such abscesses differ very markedly from cellulitic abscesses, and will quickly disappear when they have once found an outlet. The former discharge their contents imperfectly. A troublesome sinus remains for years, producing serious ill health. Among the secondary changes resulting when salpingitis is unilateral is an extension of the peritonitis to the other side of the pelvis, involving the healthy uterine appendages in a mass of adhesions, which obstruct both tube and ovary. Such a condition may be followed by hydrosalpinx.

Hydrosalpinx may result as a complication of salpingitis, but is rare.

Effusion of blood within the tube (hematosalpinx) in the great majority of cases arises as a consequence of tubal gestation, but occasionally may be independent of the latter.

388. Symptoms.—The first characteristic of acute pelvic peritonitis is pain in the lower part of the abdomen, which is sudden in its onset. For a few hours it is extremely severe, associated with fever, with an elevation of temperature, with increased rapidity of pulse, and often with vomiting. An early symptom is more or less intestinal distention, which may be general or localized. Following the acute pain, movement is attended with great suffering, because of the tender, inflamed parts, and the patient is generally obliged to remain in bed for a length of time which will depend upon the severity of the attack. Rigors are infrequent, unless the condition is part of a diffuse septic inflammation, or the result of intraperitoneal rupture of a pyosalpinx or a suppurating ovary. Constipation is usual. Pain precedes defecation and micturition, owing to the contiguity of the inflamed part to the rectum or bladder. Not infrequently the pain is greater at the completion of micturition. The patient generally assumes the recumbent position, with the limbs flexed, and guards the abdomen against the pressure of clothing or contact with the hand. In subacute or chronic cases there is pain in the back and inability to undergo physical exertion. Menstruation is more profuse than normal, often painful. Very trifling causes will result in recurrence of the attacks. This is particularly true when the chronic pelvic peritonitis is maintained by the presence of pelvic suppuration. Recurrence of pain and abdominal tenderness are more reliable indications of the presence of pus than is elevation of temperature. Not infrequently a large quantity of pus may be found in the pelvis of the patient, who has either a normal or a subnormal temperature. Patients in whom extensive suppuration exists are found emaciated, and incapacitated for work or exercise. In the worst cases the patient will be bedridden. The amount of suffering depends upon the nature and extent of the disease and upon the social position of the patient; in other words, upon the demands that are made upon her activity. In an acute attack the abdominal muscles are kept rigid over the affected parts. This rigidity is due to muscular contraction, and is beyond the control of the patient. Occasionally, by abdominal palpation a definite swelling can be recognized. This is particularly true when the mass is situated above the brim of the pelvis, has attained a large size, or presents an encysted exudation of serum or pus in front of the uterus or against the pelvic wall. Occasionally, the abdominal enlargement will be due to the presence of serous fluid. When depression of the vaginal roof occurs, it will not be lateral, but central, because the accumulation of effusion, serous or purulent, is in Douglas' pouch. Upon vaginal examination the parts may be very tender, with a sense of resistance, or the uterus is pushed forward. After subsidence of the acute symptoms a careful bimanual examination, with possibly the patient under an anesthetic, will often reveal in the posterior fossa of the pelvis the presence of a fixed, irregular, tender swelling. This begins at the uterine cornu as a cylindric body, equal in thickness to a lead-pencil; it may be rolled between the fingers, but may suddenly become thicker a short distance externally; it curves upon itself, may completely reverse its direction, and finally ends behind the cervix uteri in the pouch of Douglas. A Fallopian tube can be adherent to the ovary, which is embraced within the concavity of its curve, and surrounded on all sides by a thickened adherent peritoneum. The uterus is not always displaced, but is often found retroverted or retroflexed, and adherent in an abnormal position. Again, it may be pushed forward by the mass of effusion in Douglas' pouch. The shape and consistence of the swelling vary in different cases, as the tube may be soft, sausage-shaped, particularly when its abdominal ostium is occluded, or it may be distended mostly to the outer end, giving it the shape of a retort. Occasionally it is irregular, distended from sacculation, thrown into knuckles or prominences, bent upon itself, with sausage-like convolutions produced by intervening constrictions. Its consistence depends upon the extent to which the walls of the tubes have become thickened and upon the induration of the surrounding peritoneum.

389. Diagnosis.—Peritonitis may be confounded with hematocele and cellulitis. Pelvic hematocele is readily distinguished by the clinical history, slight febrile disturbance, the history of a possible tubal gestation, severe pain attending the rupture of the latter, and the subsequent bloody discharge from the uterus. The distinguishing features between peritonitis and cellulitis are as follows:

PERITONITIS.	CELLULITIS.
1. Inflammation chiefly confined to the pelvic peritoneum.	1. Inflammation principally affects the pelvic cellular tissue.
2. Inflammation bilateral.	2. Inflammation unilateral

Differential Diagnosis.—

PERITONITIS.	CELLULITIS.
1. Onset sudden, with severe pain.	1. Onset insidious, pain not marked.
2. Both legs drawn up.	2. One leg drawn up.
3. Firm, flat effusion around the uterus or a mesial bulging produced by serous effusion in Douglas' pouch; vaginal portion of the cervix normal length.	3. Firm effusion bulging usually into the fornix of the one side; cervix apparently shortened on the affected side.
4. Does not spread around the round ligament and iliac fossa; may affect the entire peritoneum.	4. Exudation, or pus, spreads in definite directions; usually localized.
5. Uterus displaced forward or backward.	5. Displaced to one side.
6. Vomiting frequent.	6. Vomiting infrequent.

390. Prognosis.—The mortality of peritonitis is much higher than that of cellulitis. Even when the patient recovers, the after-effects are more troublesome, and not infrequently the sequels are sufficiently serious to entail a life of chronic invalidism. The disease from which the peritonitis originates remains after the subsidence of the acute attack, and constitutes a focus from which subsequent attacks are likely to result, either from changes in the diseased tissues or from external agencies. Recurring attacks of peritonitis are much more likely to occur when associated with the presence of pus, either in the form of pyosalpinx, suppurating ovary, or intraperitoneal abscess. The damage done to the uterus, ovaries, and Fallopian tubes, particularly to the latter, by the obstruction of the abdominal ostium necessarily causes sterility. If the gradual absorption of the morbid products permits the occurrence of conception, the continuation of pregnancy to full term may be rendered impossible by the inability of the organ, from extensive adhesions, to reach its normal extension. It is not possible, however, to say that pregnancy can not occur, for experience has demonstrated that

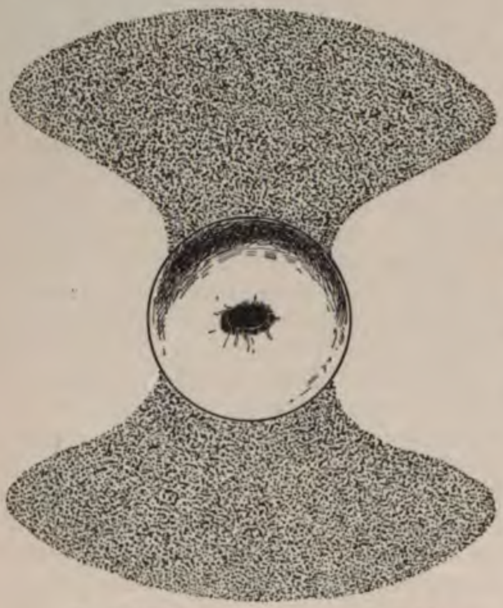

Fig. 298.—Induration from Peritonitis.

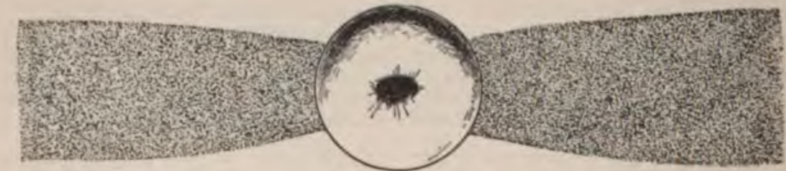

Fig. 299.—Induration from Pelvic Cellulitis.

even after the most virulent peritonitis the parts may so recover themselves as to permit of a subsequent conception. The discreet practitioner will consequently hesitate positively to assert that the patient can not give birth to children. Another effect of pelvic peritonitis is *interference* with normal action of the intestinal canal.

The final termination must depend upon the condition of the individual patient.

391. **Treatment.**—First, and most important, is prevention. The large majority of nonpuerperal cases originate in gonorrheal salpingitis; consequently, the treatment should consist in the arrest of the infection before it has extended beyond the reach of local application. Unfortunately, gonorrhea is too frequently regarded as an unimportant affection, while it probably destroys the health of a larger number of women than does the much more dreaded poison of syphilis. The earlier symptoms of the disease usually pass unregarded. They are attended with but little pain—often none, if the urethra is not involved—and the significance of the purulent discharge is not realized. Medical advice, consequently, is unsought until the infection has produced serious results or has inflicted lifelong damage. Even when advice is obtained, the disease is seldom regarded seriously, and vigorous treatment is not employed. A purulent vaginal discharge in a recently married woman should always be regarded with grave suspicion, and its treatment should be undertaken with a due sense of responsibility. There should be preventive treatment of cases produced by septic salpingitis, which include: first, nearly all the nonpuerperal cases unaccounted for by gonorrhea; second, all the cases traceable to abortion, parturition, and surgical manipulation require rigid adherence to the rules of aseptic surgery and midwifery; particularly, the thorough and elaborate disinfection of hands, instruments, and sponges.

When the patient has once been the victim of pelvic peritonitis, it is extremely important that all causes likely to provoke a relapse should be avoided. She should be careful in her dress, should not be exposed to cold or damp, especially during her menstrual period, and exhaustive exercise or overfatigue should be guarded against. Prolonged standing is as disastrous as excessive exercise. She should be cautioned to secure sufficient rest, and the state of the bowels should be carefully watched. Intestinal adhesions naturally increase the tendency to habitual constipation. The fecal accumulation favors the development and migration through the coats of the intestines of pathogenic microorganisms, so the tendency to constipation should be overcome by suitable aperients, or by enemata of glycerin or of soap and water.

The medical treatment is very similar to that employed in pelvic cellulitis, with the exception that opium and its derivatives may be necessary in some cases of peritonitis. Their administration, however, should be regarded as an unavoidable evil, and only small quantities should be given, and these discontinued as early as possible. Constipation should be prevented by sufficient aperients or enemata, or both. Accumulation of scybala is more harmful than active purgation. During an acute attack the patient should rest in bed, and the diet should be restricted to liquid or easily digested food at regular intervals. The pain should be relieved by the application of the ice-bag, or, if this is uncomfortable, by hot fomentations. Intestinal distention is relieved by the use of enemata. The patient will probably be tormented by thirst and by the desire for ice or to drink efferves-

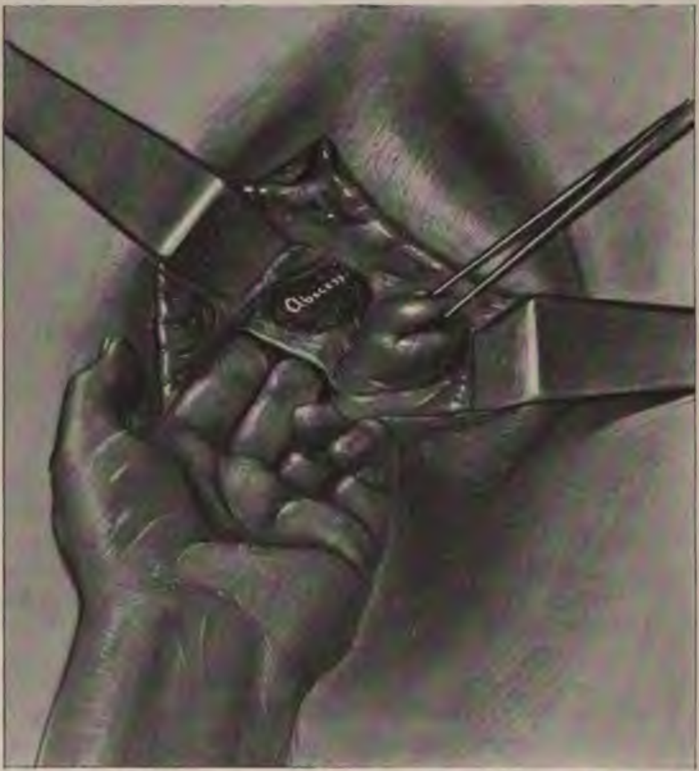

Fig. 300.—Vaginal Incision for Pus Collection in Broad Ligament.

cent waters. She will find much greater relief from frequent sipping of hot water. Ice should be avoided, as, when once employed, it increases the thirst, and the patient will be constantly demanding it, with the result, if granted, that the mouth and tongue will soon suffer from a severe attack of glossitis. If the enemata fail to give relief, an aperient should be administered—doses of calomel, castor oil, or, what is more efficient, sulphate of magnesia. The latter may be given in one- to two-dram doses, dissolved in syrup of ginger and cinnamon-water, every two or three hours until the bowels are freely evacuated; subsequently three or four times a day, as the condition may demand. A palatable method of administration of sulphate of magnesia is to give a teaspoonful of saturated solution, which has been strained, mixed with an equal quantity of lemon-juice, and given while

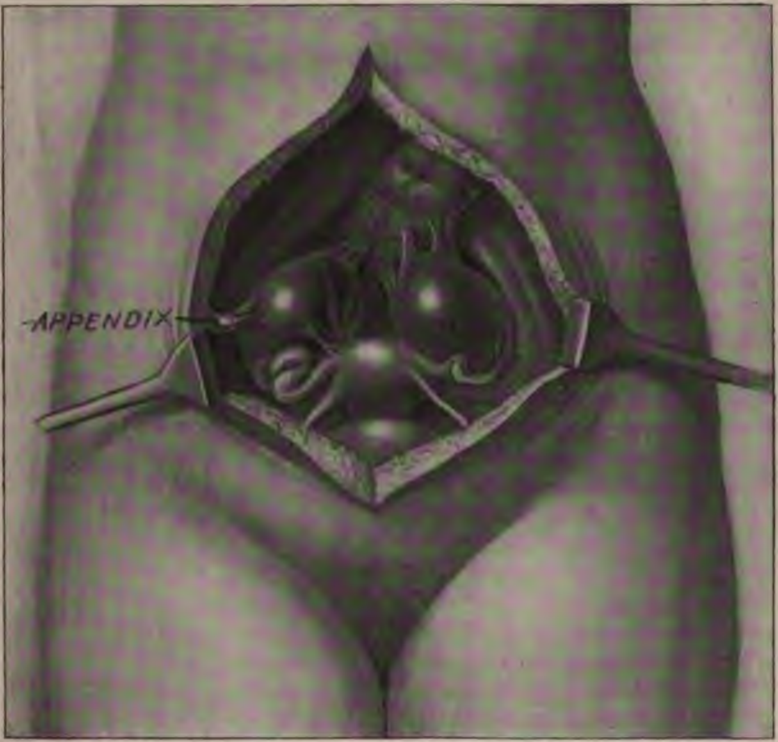

Fig. 301.—Double Pyosalpinx Showing Adhesions to the Rectum, to the Uterus, and, on the Right, to the Appendix.

effervescing. The state of the pulse is a more correct guide to the condition of the patient than the temperature, and will indicate the need for stimulants. If the pulse shows signs of flagging, becomes thin, feeble, and intermittent, brandy or whisky should be given in regular doses, diluted with five or six times the quantity of water, and its effect carefully watched, the dose to be increased or diminished according to its influence. Stimulants should not be allowed to take the place of food. The indications of collapse—coldness of the extremities, sunken features, flagging pulse, subnormal temperature—should be further combated by the application of external heat and by hypodermic injections of strychnin and atropin or digitalin. The intensely depressing effect of intestinal distention should be kept in mind, and this condition should be relieved by the use of enemata or by the introduction of a soft rubber rectal tube with the patient turned upon the side. Not infrequently, as suggested by Keith, an injection of quinin, gr. vj, whisky, f℥ss, and water, f℥ij, repeated every hour until three doses have been given, stimulates the nerve centers and increases peristalsis.

The occurrence of peritonitis should lead to careful examination of the pelvis, and any indication of tenseness of Douglas' pouch or about the cervix should be considered an indication for immediate vaginal incision to break up the tissue and permit the fluid to escape. The opening should be kept patulous by the introduction of a gauze drain. Such a course will not infrequently arrest or limit the progress of the inflammation. The mere removal of the tension affords great relief. If an intraperitoneal abscess exists, such interference not only affords relief, but may anticipate its bursting into the rectum and the establishment of a troublesome sinus. Unless such conditions can be determined, however, it is wiser to defer surgical intervention until the acute symptoms have subsided. If an attack is the first the patient has had, and the swelling is so slight as to indicate a possibility of a probable nonpurulent inflammation, operative interference should not be advised. If the patient has repeatedly had similar attacks, and swelling of such a size is found as to render it probable that in its midst there is an occluded, distended Fallopian tube or an enlarged, cystic ovary, operation should be urged. Such a mass, with the recurring attacks, almost positively indicates the presence of pus; and where pus is present, surgery is absolutely indicated. It is impossible, of course, to lay down positive rules: every case must be decided upon its merits. A woman from the laboring class can not afford to spend as much time in invalidism as a woman in better circumstances.

When operation has been decided upon as necessary, the method of procedure still remains undetermined. Abdominal section being the older and more generally adopted procedure, it will be first described. For the preparation of the patient see Section 124. The patient is placed upon the operating table, preferably one by which the Trendelenburg posture can be secured, and an incision from 2½ to 3 inches long is made in the median line, beginning an inch above the symphysis pubis. The operator must remember the possibility of adhesions between the intestines, the omentum, and the anterior abdominal parietes, and should proceed carefully as he approaches the peritoneal cavity. Generally the omentum is adherent to the mass in the pelvis, over the surface of the uterus, the tubes, or the ovaries. The first step is to separate these adhesions, and to free the omentum and any coil of intestine which may be adherent. The omentum and intestines are drawn upward to expose the matted contents of the pelvis behind them. When the patient is lying flat, we have to be guided almost entirely by the sense of touch. In the Trendelenburg posture we are aided in our manipulations by sight. Following the fundus of the uterus as a guide, the operator endeavors with the tips of the first two fingers to enucleate the diseased uterine appendages from their adherent surroundings. The fundus of the uterus may be free or may be implicated in the adherent mass. In the latter case its identification may be exceedingly difficult, rendering it necessary for an assistant to pass one or two fingers into the vagina to elevate the uterus by pressure against the cervix. The fundus is thus identified. The affected tube, on one side, is traced out from the uterine cornu and made to serve as a guide when searching for planes of adhesion. If it turns backward and becomes lost in the adherent mass, the safest way is to keep the fingers close to the posterior surface of the uterus, and to trace the adherent mass downward to Douglas' pouch. In breaking up the adhesions it is necessary to separate the mass from the walls of the bowel, including the anterior wall of the rectum. It is often advisable to have an assistant pass his forefinger into the rectum, partly to facilitate the separation by steadying the bowel, partly to ascertain where the bowel is and whether the manipulation is in dangerous proximity to it. The separation of these adhesions in Douglas' pouch is generally the most difficult part of the operation. Indeed, I know of no operation more difficult than to have to break up adhesions which have existed for a long time between knuckles of intestine and the fundus of the uterus or the ovaries and tubes. The separation is to be continued posteriorly from below upward. When the mass has been cleared from its posterior and inferior attachments to the uterus and to the uterine appendages of the opposite side, there still remain adhesions to the back of the broad ligament, which has become more or less folded over the diseased parts, and forms a deep, concave surface on its posterior aspect. This concave surface has to be unfolded in order to permit the mass to be brought into view and the broad ligament below it to be transfixed. This separation can be accomplished by working from below upward, and should be continued until the ovary and tube remain attached to the uterus and broad ligament by their anatomic connections only. The pedicle is then tied in the same manner as in the removal of the normal ovary and tube for the relief of myoma. The appendages on the opposite side are examined, and are removed or left, according to their condition. If merely adherent, the operator may content himself with separating adhesions.

During such manipulation it is not infrequent to find an escape of pus, which may be independent of any fault of the operator. It is often difficult to accomplish without rupture the separation of adhesions around the ostium of a suppurating tube or the enucleation of a suppurating and adherent ovary the wall of which is thinned and nearly ready to burst. Fortunately, unless the pus is unusually virulent, no serious harm results. We should always exercise care, in such cases, to wall off the general peritoneum and intestine by several layers of gauze pads, to prevent their being soiled. Occasionally, in severe cases, when the patient is much depressed, the persistence required for the separation of extensive adhesions would so prolong the operation as to endanger the life of the patient. It may be necessary to content ourselves with mere emptying and draining of the suppurating cavity. The greater the experience of the operator, however, the less frequent will be the incomplete operation. Separation of adhesions of parts of the intestinal canal other than the rectum should be made as much as possible under the eye, and injuries to the structures should be immediately repaired. The inexperienced operator should be careful not to mistake a thickened and adherent intestine for an inflamed Fallopian tube. This mistake may be avoided by following the tube toward the uterus before an effort is made at its separation.

When an ovary is found to be free from disease, notwithstanding the disease by which it is surrounded, it is good practice not to remove it, even though it may be necessary to remove the corresponding tube. The presence of the ovary will prevent arrest of the menstrual function and will save the patient from the discomfort that attends the premature induction of the menopause. The rule should be to remove only diseased tissues, but it should be the routine practice, where a gross lesion is limited to one side, that the tube of the opposite side should be carefully examined. If pus exudes from it on pressure, the proper course is to remove it, notwithstanding the absence of thickening of its walls or of obvious sign of disease. Not infrequently the tube opposite to that which is chiefly affected has become transformed into a retention cyst, forming a hydrosalpinx, by occlusion of its abdominal end. Either the tube should be removed or its contents evacuated, and a portion of its wall excised, stitching together the mucous and peritoneal surfaces.

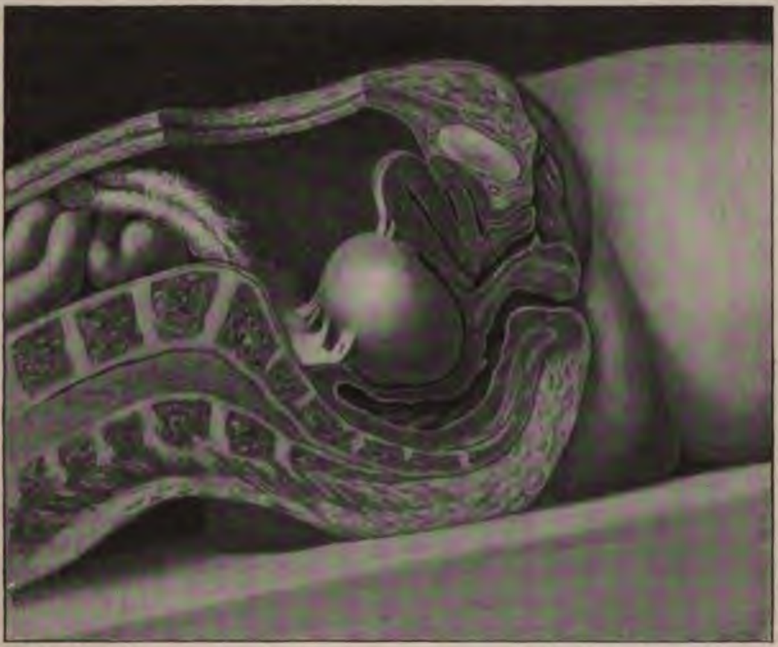

Fig. 302.—Intestines Held Back by Gauze. Patient in Trendelenburg Posture.

During the performance of these operations the general peritoneum should be carefully protected by drawing up the intestines and omentum, packing them back with gauze or gauze sponges, so that it shall not be soiled by rupture of an abscess cavity. After the completion of the operation, and when the parts have been dried, it is well to douche the cavity plentifully with a hot normal salt solution, cleansing the surface by irrigation rather than by the use of the sponge or its substitutes. Drainage must be decided by the indications of the individual case. The larger the experience of the operator, unless he is particularly prejudiced, the less frequently will he be likely to use drainage. Even in the most virulent cases, with extensive adhesions, irrigation of the cavity with a large quantity of normal salt solution, repeating it before the cavity is closed and leaving a considerable quantity of fluid within the abdomen, dilutes any poison that may remain and renders it less active and less likely to produce deleterious effects. In this way drainage may be avoided. In suppurative peritonitis McCosh suggests intra-intestinal injections of saline cathartic. He cleanses the peritoneal cavity thoroughly with irrigation instead of sponging. Through a hollow needle, between one and two ounces of sulphate of magnesia in saturated solution is introduced into the small intestine at a point as high as possible in the jejunum or ileum. The needle-puncture is closed by a Lembert suture. The action of the saline produces free watery discharges, and thus makes the intestine act as a drainage-tube for the peritoneal cavity. When drainage is used in suppurative cases, the gauze or wick drain, in which a number of strands are introduced into different parts of the abdominal cavity, is the preferable method of drainage. If the ends are carried well around the side of the body, and are surrounded by cotton and gauze at a point below the level of the internal ends, we then secure a siphon-like action, which more effectually drains the cavity.

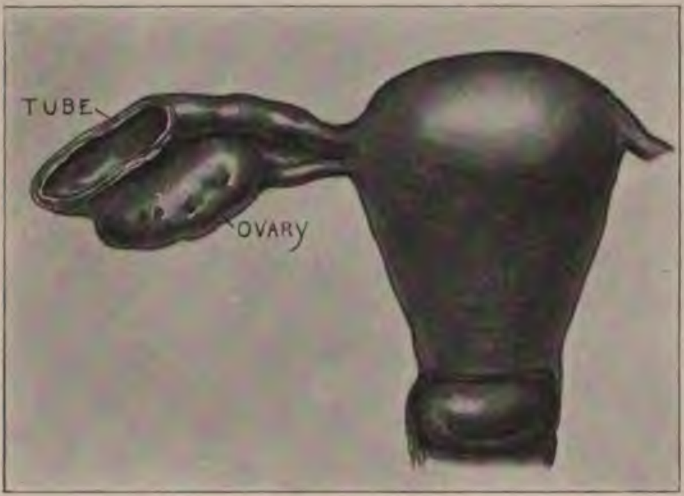

Fig. 303.—Resection of the Tube.

Postural drainage, recently suggested by Clark, utilizes the healthy and unirritated portion of the peritoneum for the absorption. He recognized that, in the ordinary positions of the body, fluids, serum, and blood are likely to accumulate on the portion of the peritoneum which has been injured and is less able to take care of them, and in which there are, possibly, still remaining tissues impregnated with pathogenic germs. A culture-fluid is thus brought in contact with the germs at the most favorable temperature. Such a misfortune is avoided by elevating the foot of the bed thirty-six inches. The patient is occasionally turned, from side to side, so that no fluid accumulates in the pelvis, but is drained upward upon the healthy peritoneum, which is abundantly able to take care of it. This posture also, by decreasing the amount of blood that is sent to the injured part, saves the patient from very much of the distress which ordinarily results from the operation. Another advantage of this procedure is that it permits us to close the wound, to avoid the annoyance of a weakened abdomen, and thus to decrease the risk of hernia. In closure of the wound we must endeavor to utilize such measures as will bring together and hold in apposition the tissues, so that firm union may be secured and the risk of hernia lessened. Various methods of procedure have been employed to accomplish the purpose: the introduction of a double row of sutures or of a series of sutures, one in the peritoneum, another in the aponeurosis, and another in the skin. The difficulty in the introduction

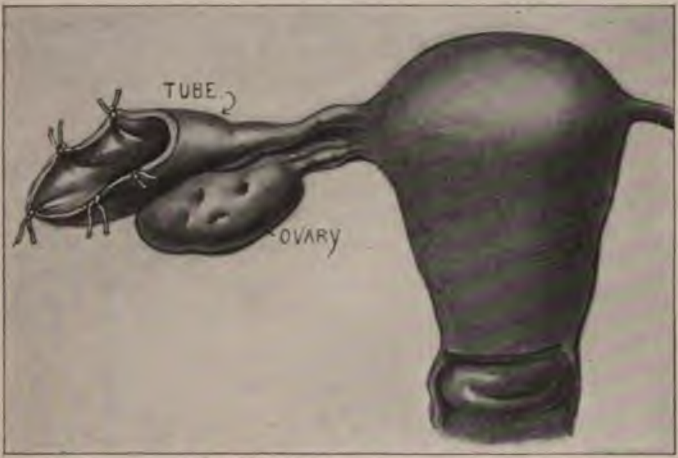

Fig. 304.—Appearance upon Completion of the Operation.

which extend on each side ½ of an inch outward from the circular incision and parallel with the lower border of the broad ligament. This incision about the uterus is preferably made with the thermocautery, for, in addition to the decreased bleeding, the burn prevents the surfaces from uniting at once and affords better opportunity for drainage. After cutting through the vagina the tissues are pushed from the cervix with the finger. The separation between the bladder and the cervix is accomplished by blunt dissection, with the finger or a blunt instrument, or by successive snips of the scissors. Eastman pushes the scissors in closed, close to the cervix, and then separates the points, and thus accomplishes the dissection. The attachments posteriorly can be more freely dissected, as there is but little danger of injuring the rectum. Having completed the dissection front and back, and opened the peritoneal cavity, the uterus is held by the broad ligaments, through which pass the uterine and ovarian arteries. With the fingers to guide, the lower inch of the broad ligament on each side, which includes the uterine artery, is secured either by ligature or forceps. During the introduction of the ligature or the application of the forceps the index-finger over the anterior surface of the broad ligament pushes back the ureter and prevents its being injured. The broad ligament on each side, thus secured, is divided between the ligature and the cervix to a height corresponding with the portion secured. The cervix is

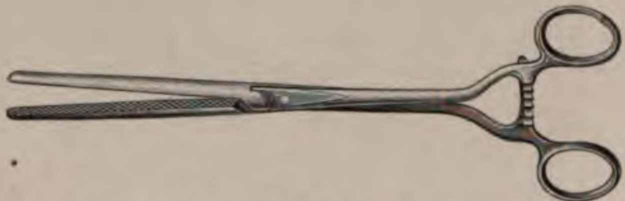
Fig. 307.—Clamp Forceps for Securing the Broad Ligament.

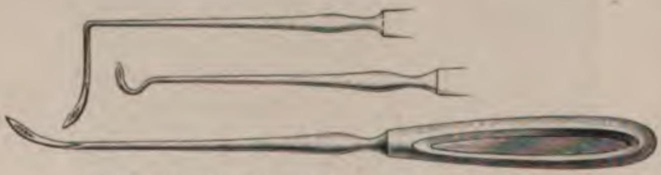
Fig. 308.—Deschamp's Needle Ligature Carrier.

amputated, the portion of the uterus above having been previously secured with a double tenaculum, in order to keep it under control. This portion is then drawn upon, and, unless extensive inflammation has existed, or the organ is very large, the anterior culdesac not already opened can readily be incised and the fundus of the uterus tilted forward. The finger passed over the fundus can readily reach the broad ligament, which is put upon the stretch, and the ovary and tube, preferably of the left side, are enucleated and drawn down; or, if the enucleation is difficult, the broad ligament can be secured with several pairs of small forceps and cut through. Subsequently, the tube and ovary can either be brought down, or, when adhesions are too extensive to permit it, the cavity is broken up and the portion of broad liga-

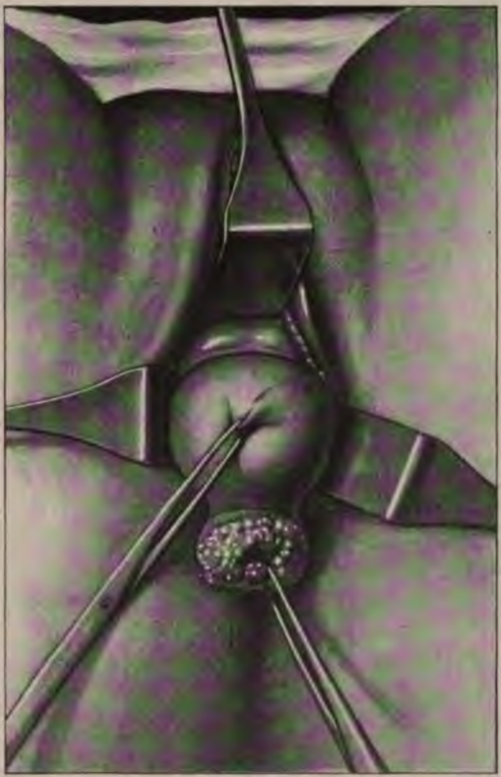

Fig. 309.—Drawing Forward the Fundus.

ment secured by a single clamp forceps. The same plan of treatment is pursued upon the opposite side.

If the uterus is large, or if firm adhesions exist, we may proceed to remove it by morcellement. The organ is pulled down, a piece cut out from the center which allows the sides to be drawn inward, and successive pieces are thus removed until the fundus is reached, observing the precaution, however, that the entire operation shall be done under the eye. If during the separation of adhesions pus is seen to escape, the opening into the pus collection is enlarged with the finger and the cavity is irrigated, after which the operation is resumed. When it is possible to separate the adhesions, the inflamed uterine appendages are gently pulled down into the vagina, the pedicle is ligated or clamped, and the mass is removed. If the tubes present large, thin-walled masses, filled with pus, the surrounding parts should

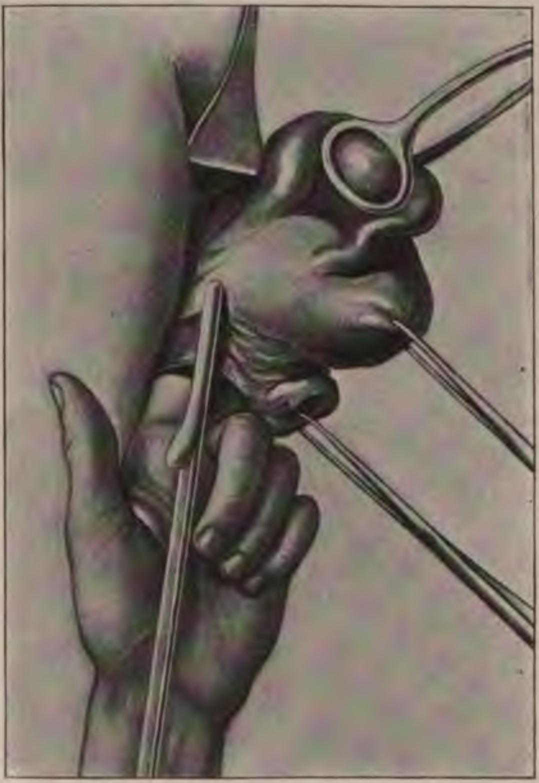

Fig. 310.—Application of the Clamp Forceps to the Lower Portion of the Broad Ligament.

be protected by gauze pads secured by hemostats, and the tube should be so opened with a knife that the contents shall escape into the vagina without soiling the peritoneum. The edges of the opening are seized with forceps to guard against retraction of the sac, the cavity is irrigated with a normal salt solution or with a formalin solution, and the tube is then removed by enucleation. When the removal of the sac is impracticable, its cavity may be opened, thoroughly packed with gauze, and atrophy thus be secured. Search should be made with the finger for outlying abscess cavities in order that they may be opened and drained. The dressings are similar to those in ordinary vaginal hysterectomy; iodoform gauze is lightly packed into the pus cavities and is removed, together with the tampons, in six days. Clamp forceps may be removed in forty-eight hours. The control of hemorrhage by

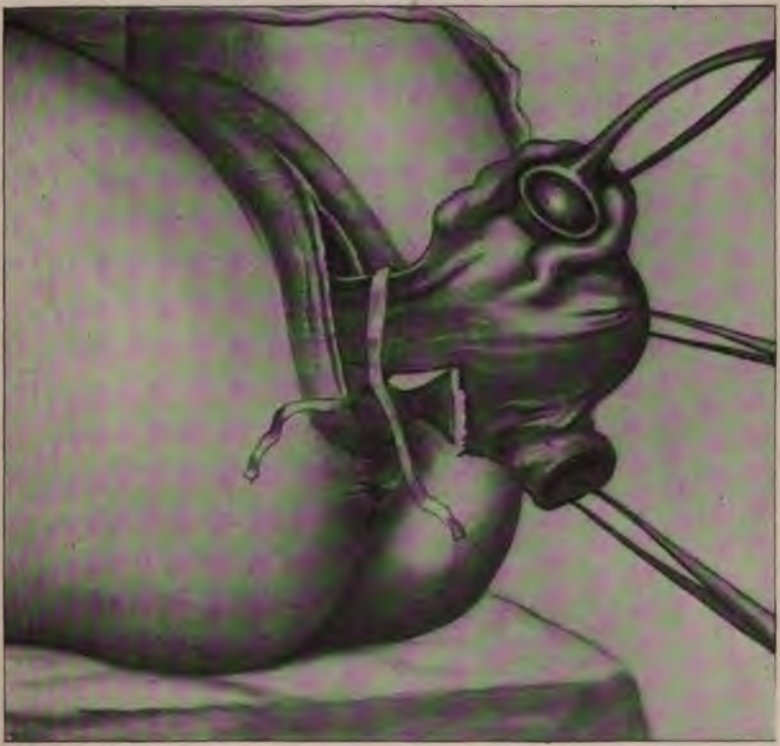

Fig. 311.—Ligation of the Broad Ligament in Vaginal Hysterectomy.

the clamp greatly expedites the operation, but possesses the disadvantage that the wound must heal by granulation and the formation of cicatricial tissue. The tissue within the clamps becomes necrotic and engenders infection. The ideal method is the immediate union of the vaginal surfaces. A rectal enema should be given on the third day, and a nourishing diet should follow the operation. It is claimed for this operation that its mortality is less high; it enables the operator to see better what he is doing, is attended with less shock, insures better drainage, does away with the liability to ventral hernia and troublesome sinuses, and as the uterus was the source of the infection, its removal is a distinct gain. There are fanatics on both sides of the question, some of whom would never perform a vaginal operation, others who would claim that the vaginal operation should always take precedence; but the truth lies between the two. There are cases which can be better treated by the abdominal operation: first, when small masses are found on one side of the uterus, in which it is probable that one tube and ovary may be saved; second, in very extensive and firm adhesions, when the opportunity for inspecting the upper part of the uterus and the tubes as we proceed affords a better method of procedure. On the other hand, in enlarged pus collections, when the patient is very greatly debilitated, and her health is such as to render her

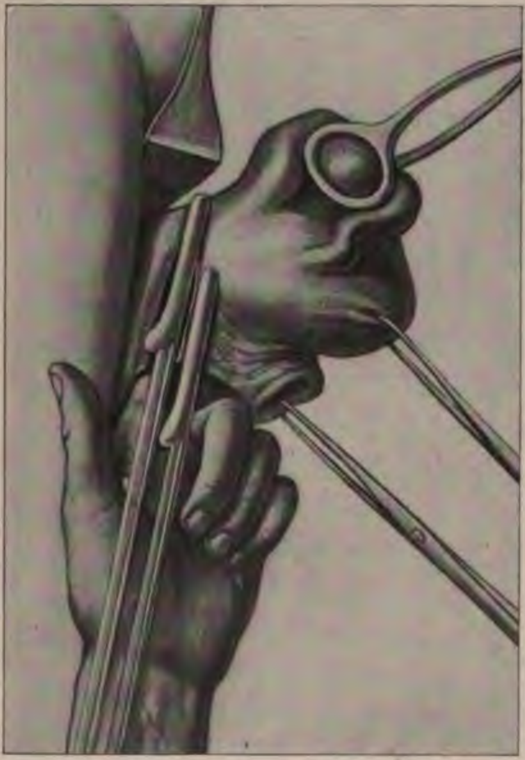

Fig. 312.—Upper Portion of the Broad Ligament Secured by Clamp Forceps.

condition unfavorable for a serious abdominal operation, the vaginal incision, with the opportunity for drainage it affords, is the preferable operation, and should always be practised, even though it should subsequently be necessary to perform a secondary operation through the abdomen. When the time comes for such an operation, the patient is in a better condition than she would have been if the vaginal operation had not preceded.

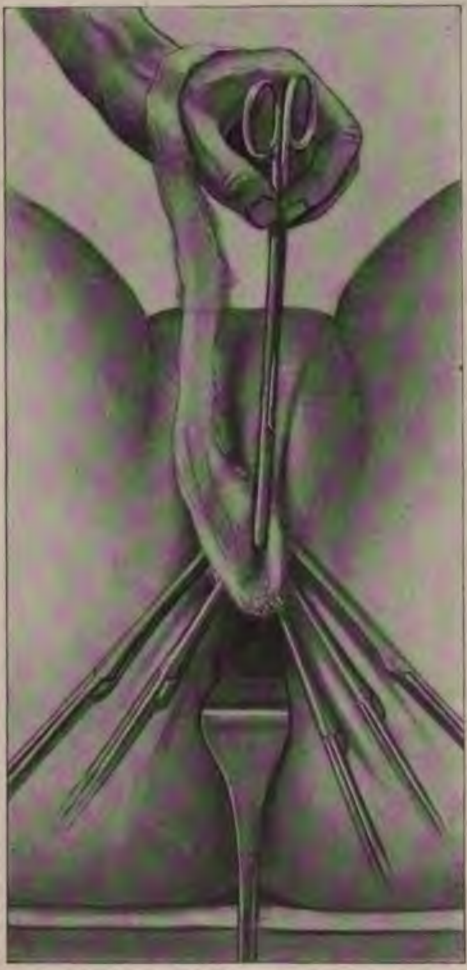

Fig. 313.—The Introduction of Gauze after Removal of the Uterus.

Landau advocates splitting the uterus into two portions by an anteroposterior vertical incision. One-half of the organ is pushed up, while the other is drawn down. This procedure permits more ready access to the ovaries and tubes.

392. Description of the Fallopian Tube.—To understand and appreciate the influence of the Fallopian tube, we must keep in mind its common embryonic origin with the remaining portion of the genital canal. We can then understand that inflammation which involves the uterine mucous membrane can very readily involve that of the tube. The Fallopian tube is about from ten to twelve centimeters in length, occupies the upper part of the broad ligament, and is enveloped by peritoneum, with the exception of the intraligamentary portion. It is divided into the isthmus, the ampulla, and the fimbriated extremity. The

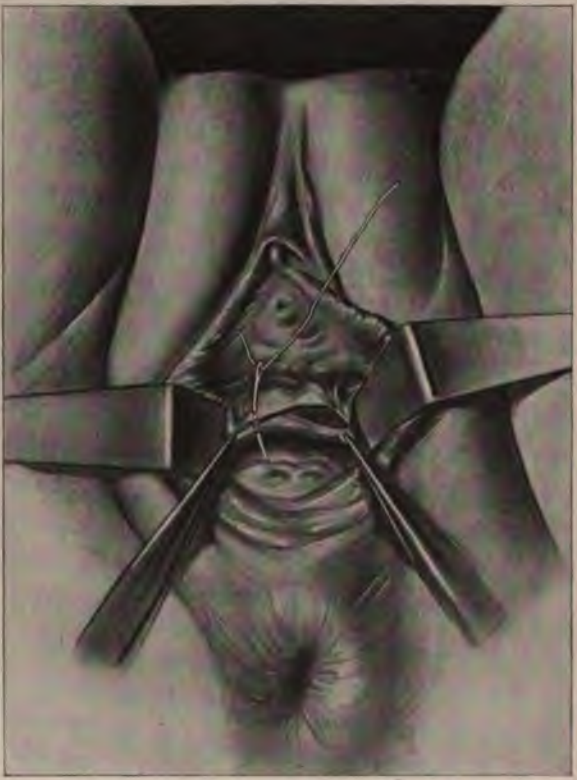

Fig. 314.—Closure of the Vaginal Wound by Sutures.

isthmus, being the narrowest portion, is situated at the uterine end. The fimbriated extremity has a number of fringes, which are lined upon the inner side with mucous membrane and externally with peritoneum. The tube has three coats: first, the enveloping peritoneum, which is incomplete; second, the muscular layer, which consists of longitudinal and circular fibers; and, third, the mucous membrane. The contraction of the longitudinal and circular fibers gives rise to a certain vermicular motion of the tube, which facilitates the passage of the ovum toward the uterus. The mucous membrane is thrown into longitudinal folds. It has a basement membrane, but no submucosa distinct from the mucosa proper, and no tubal glands. It has a single layer of columnar ciliated cells.

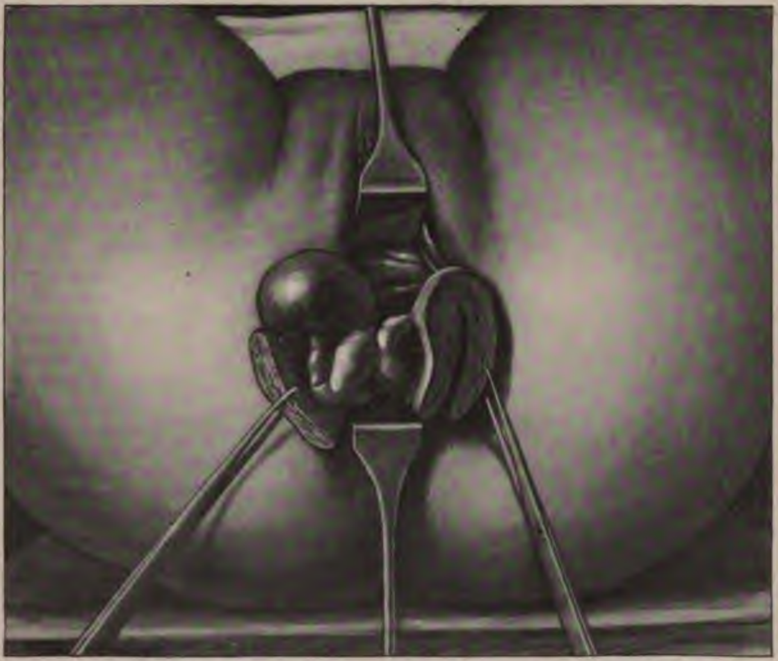

Fig. 315.—Landau's Method of Delivering the Uterus after Its Complete Median Section.

393. Inflammation of the Fallopian Tube.—Inflammatory changes in the Fallopian tube may involve the mucous membrane, when the condition is known as salpingitis, or may extend to the parenchymatous tissue and muscular wall, when it is known as interstitial salpingitis, or may involve the external covering, when it is called a perisalpingitis. Extension of inflammation to the tube produces thickening of the mucous membrane,

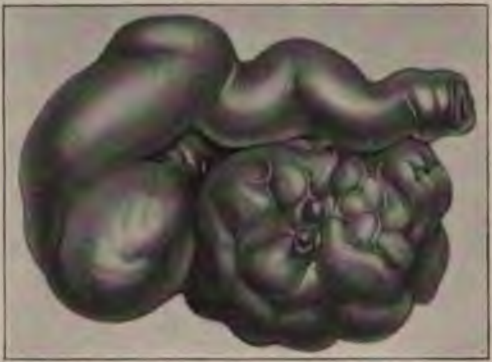

Fig. 316.—Convoluted Fallopian Tube from Perisalpingitis.

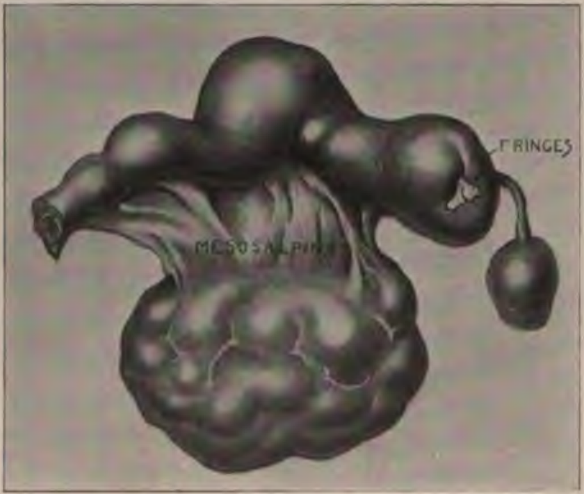

Fig. 317.—Incomplete Inflammatory Closure of the Fallopian Tube. Portions of Fimbriæ Unretracted.

increased cell proliferation, and desquamation or partial desquamation of its epithelium. If the swelling results in obstruction of the uterine end of the tube, the further passage of secretion is prevented. As the tube enlarges toward its abdominal ostium, the mucus readily escapes into the peritoneal cavity, producing irritation and inflammation of an adhesive character, with narrowing and closure of the abdominal end of the tube. In mild cases of inflammation such a course, with a resulting accumulation within the tube, forms a hydrosalpinx. As this accumulation increases, with possible subsidence of the inflammation, the uterine end of the tube reopens from pressure, and an occasional discharge of the tubal contents takes place through the uterus—a condition known as hydrops tubæ profluens. As the secretion accumulates it causes enlargement of the tube, its mucous membrane spreads, and the folds are obliterated. At points we may find a fold that will have lost its superficial epithelium, and the swollen and inflamed papillæ lying in contact become united, causing the apparent formation of a cyst. This condition is called salpingitis cystica nodosa. With inflammation of the muscular layer of the tube we have contraction of the longitudinal fibers, which draw up, and fold in the fimbriæ and close the peritoneal layer over them. In this way the fimbriæ are completely inclosed within the orifice of the tube, and present a rounded, blunt end. Occasionally, we find that the inflammation results in the contraction of the abdominal ostium, without the complete infolding of the fimbriæ, so that portions of them remain. In such cases a fistula is present, through which occasional discharge or leakage occurs, producing recurrent attacks of pelvic peritonitis. As we have already seen in the discussion of pelvic peritonitis, infection may pass through the walls of the closed tube, and produce localized peritonitis. Not infrequently, with inflammation of the tube, even before closure has occurred, the mucous membrane has lost its epithelium, and has formed places which no longer favor the passage of the ovum through the canal. In such cases a fecundated ovum can lodge in the tube from loss of the ciliated epithelium, contraction of the canal, or diminished peristaltic action. The ovum thus lodged finds nourishment, and develops until it reaches a size which the tube can no longer accommodate, when rupture occurs.

394. **Symptoms.**—Tubal inflammation presents no distinguishing characteristics. When the patient has had an acute inflammation within the pelvis, which produces extreme tenderness in either inguinal region, it is justifiable to conclude that the irritation of the peritoneum, possibly a pelvic peritonitis, has been produced by an extension of the inflammation through the tube. Pain following menstruation and situated in either inguinal region is justly attributed to tubal inflammation. In normal conditions the tube is not palpable. In diseased conditions, particularly when the tube has become thickened by salpingitis

or perisalpingitis, it may be felt as a more or less thickened cord, which slips under the finger and is generally quite sensitive. When salpingitis has existed for a length of time, associated with parenchymatous inflammation, we may find the tube contracted, thickened, and indurated, with a more or less irregular nodular condition. In closure of the abdominal ostium the tube may present an enlargement something like the shape of a retort, which increases in size as we proceed outward, or it may appear sausage-shaped or in the form of irregular sausage links. These conditions have been described under pelvic inflammation.

395. Prognosis.—The existence of tubal inflammation should always be considered a source of danger, and, even in its mildest forms, should indicate the importance of treatment of the conditions from which it has arisen in order to arrest and, if possible, to ameliorate the inflammatory trouble.

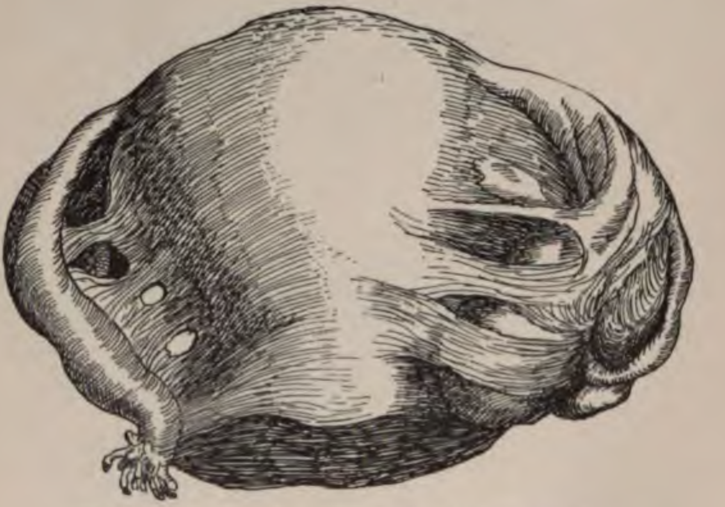

Fig. 318.—Peri-oophoritis. Tube and Ovary Encysted.

396. Treatment.—The treatment necessarily consists in the relief of the uterine inflammation and in the employment of the course of treatment recommended for endometritis. This may be supplemented by rest, by the employment of cold, by mild purgation, and by the application of counterirritants, small blisters, iodin, croton oil, and inunctions of dilute ointment of iodid of mercury—a dram of the official ointment to an ounce of lanolin. The treatment of the more serious stages of the disease has been considered under pelvic peritonitis. (Section 391.)

397. Inflammation of the Ovary.—The previous discussion of pelvic inflammation must necessarily impress the student with the fact that inflammation of the ovary is intimately associated with a most usual and widely extended inflammatory process, which involves uterus, oviducts, ovaries, pelvic peritoneum, and cellular tissue. Inflammation of the ovary occurs in two forms: peri-oophoritis, or inflammation of its surface, and oophoritis, or inflammation of the structure of the organ. Peri-oophoritis necessarily occurs in those cases of pelvic peritonitis in which adhesions to the adjacent parts result as a consequence of the pelvic inflammation. This pelvic inflammation may be secondary or primary in its relation to the disease of the ovaries. The primary condition, in which the infection has traveled to the peritoneum through the oviducts, the lymph-channels, or the blood-vessels, has been discussed. The chief function of the ovary, as is well known, apart from any supposed internal secretion, is to provide a site for the perfect development and maintenance of healthy ova, and to permit their extrusion under circumstances, as yet undetermined, that will permit them to pass into the mouth of the oviduct. Peri-oophoritis necessarily interferes with this process through the formation of adhesions about the ovary or by induration of its tunic. The ovum that has escaped can be prevented from passing into the oviduct by adhesions that fix the fimbriated orifice or that so envelop the ovary as to prevent its reaching the oviduct. These adhesions are a cause of severe suffering, especially when they limit the free mobility of the ovary and fix it in a position where it is subject to pressure,—for instance, behind the uterus, over the rectum,—or where intestinal adhesions result in its being constantly subjected to dragging and tension through the peristaltic action of the intestine. Oophoritis, like peri-oophoritis, is part of a more general disease. It may originate from gonorrheal infection, from tubercle, or as a result of septic infection. In its more acute form it is generally produced by the latter, which gains its admission through lesions of the vagina and uterus following labor, abortion, surgical operation, or accidental injury. This infection may reach the ovary through the continuous mucous membrane of the Fallopian tube or through the lymphatics and blood-vessels. The most severe forms of inflammation are those which result from septic infection. In fatal cases the ovary can be much enlarged, soft, sloughing, containing small extravasations of blood or pus, and small collections of pus will be found in the vessels of the connective tissue, or the structure of the ovary may form an abscess of considerable size, equal to that of a hen's egg or larger. The larger abscesses of the ovary probably result from suppuration of ovarian cysts. Suppurating ovaries become adherent to the neighboring structures, and when the walls are thick, the pus may remain quiescent, possibly producing a chronic state of ill health or suffering, or the pus may open into the bowel, the cavity thus be emptied, shrink, and ultimately close,

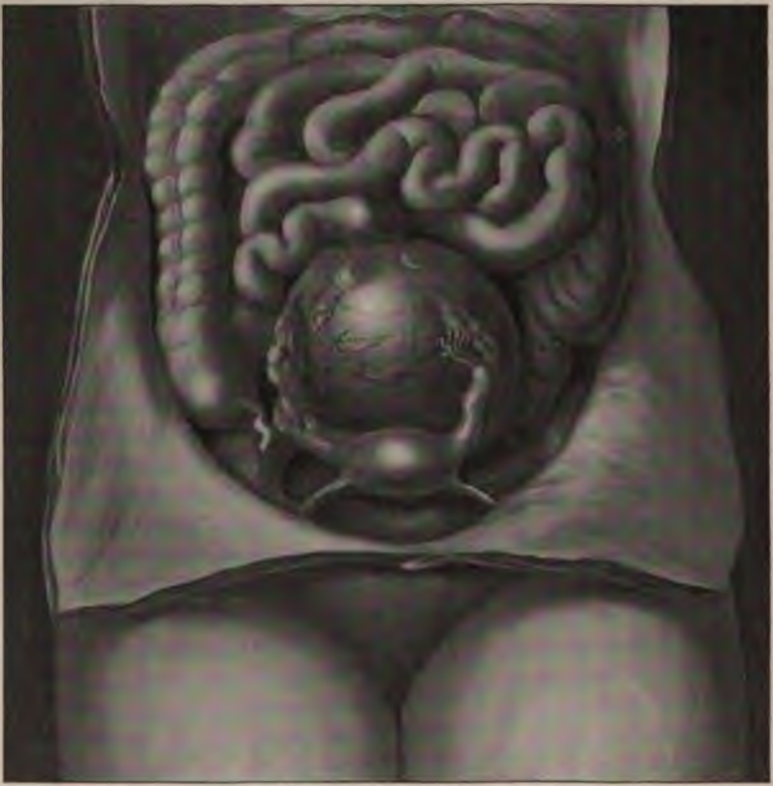

Fig. 319.—Double Tubo-ovarian Collection.

while a state of chronic ill health will still continue. An inflamed or cystic ovary adherent to an inflamed tube frequently loses its intervening wall and the cavity becomes common, forming a tubo-ovarian cyst or abscess. The coalescence of both ovaries and tubes to form such a sac results in the formation of a tumor that fills up the pelvis. There is another form of chronic inflammation of the ovary which has been denominated oophoritis serosa.

This form is chronic in development and duration, while it is curable, in the majority of cases, under proper management. It may follow fevers, it sometimes occurs after the mumps, or it may be the result of passive gonorrheal infection. The ovaries are swollen, exceedingly tender, often prolapsed. In advanced cases they become swollen, smooth, shining, and almost translucent. Fold and cicatrices are obliterated.

Cirrhosis is a term which has been applied to various changes in the ovary. This name is sometimes given to conditions which are almost physiologic; for instance, to ovaries shrunken and shriveled by atrophy—organs which are perhaps prematurely senile. In other cases the condition is abnormal only in the unusual degree of cicatricial fissure.

398. **Symptoms.**—Peri-oophoritis will cause pain, more or less distinctly localized at the pelvic brim, which extends down the thigh of the affected side. Not infrequently pain is felt in the corresponding breast. The inflammation of the surface of the ovary may extend into its substance and cause changes in the stroma, dropsy of the follicles, and hemorrhage, with a consequent degeneration of the ovary—a condition known as cystic oophoritis. Oophoritis presents no characteristic symptoms. In cases of acute septic poison there are no symptoms which are absolutely indicative of an ovarian lesion. In the less severe inflammations we may recognize the distinguishing characteristics, but they are so intimately associated with disease of the oviducts that it is difficult to differentiate them. Pain is the only constant symptom of all varieties of pelvic inflammation, and the site to which it is referred bears no constant relation to the organ affected. The whole region of the pelvis may be the seat of pain, and we can not distinguish pains which are due to affections of the tube, ovary, peritoneum, broad ligament, body of the uterus or cervix. There are obvious reasons for this. The nervous distribution of these various organs is more or less common; consequently, it is difficult to differentiate the seat of pain. Pain is aggravated, as in any inflammatory condition, by increase of pressure on or within the ovary. It is distinguished from true dysmenorrhea by the fact that it is an aggravation of the pain felt between the periods, while true dysmenorrhea is purely menstrual pain. Sometimes we find patients who assure us that the only time they are free from pain is during the menstrual flow. Pain may persist after coition, and be the result of congestive tension. Pain produced by intra-abdominal pressure, which is increased by standing, is greatly relieved by assuming the horizontal position. The pain is aggravated by direct pressure on the organs, through the

vagina or rectum, as during an examination, coitus, or the passage of large fecal masses. None of the various symptoms of pelvic disorder, such as amenorrhea, menorrhagia, or leukorrhea, are characteristic of oophoritis. We must keep in mind the wide distribution of neurotic symptoms. The local pelvic lesion may be a minor one. There may be attributed to oophoritis or to displacement of the uterus symptoms which are produced by fissures of the cervix that persist after the local lesion has been cured or removed. These conditions are a source of great disappointment to the medical practitioner. At times relief is afforded ; at others, distress and pain continue in spite of everything done.

399. **Diagnosis.**—Diagnosis may be certain when, with the finger in the vagina or rectum, we can recognize a tender body, somewhat enlarged, yet in the shape of the healthy ovary, which lies to one or the other side or behind the uterus or broad ligament. Fixation by adhesions interferes with its ready recognition, and in such cases we may be in doubt as to how much the swelling is due to the ovary, how much to the tube, and how much to adhesions. A woman recently came under my observation who presented, well down in the vesico-uterine pouch, a mass which seemed a part of the uterus, and was supposed to be a myoma. Operation disclosed an enlarged, firmly adherent ovary.

400. **Treatment.**—One of the general principles in the treatment of ovarian diseases or ovarian inflammation is rest in bed, in which, however, great care must be exercised to observe its effects upon the general health, as well as the local condition, or the patient may be encouraged to remain in bed too long. Great prudence must be exercised in the use of drugs for the relief of pain ; as these conditions are chronic, anodynes are dangerous. The acute pain will frequently be relieved by the ice-bag or by a hot application to the epigastric region or hot vaginal douches. Morphin or opium should be resorted to only in extreme conditions. In protracted cases heat loses its effect, and anodynes not only fail, but become a positive source of danger to the patient. We may have to consider the advisability of removal of the inflamed organ, but this should be done only when actual, well-determined pathologic lesions can be recognized. The important consideration should be the improvement of the general health, and in many cases, particularly in chronic nervous conditions, the plan of treatment so well known as the Weir Mitchell or rest treatment will prove most satisfactory.

DEVIATIONS OF THE PELVIC ORGANS.

401. Changed Relations of Structures of Vulva.—The structures of the vulva are influenced and distorted by hypertrophy, by inflammatory exudates and deposits, by edema, and by hernia and tumors, but are so intimately associated with the deeper structures that they are not subject to anything like displacement. All the other pelvic structures are capable of more or less marked displacement, still all are so closely related to and dependent upon uterine deviations that we will proceed to the consideration of the uterus and its displacement as a primary subject.

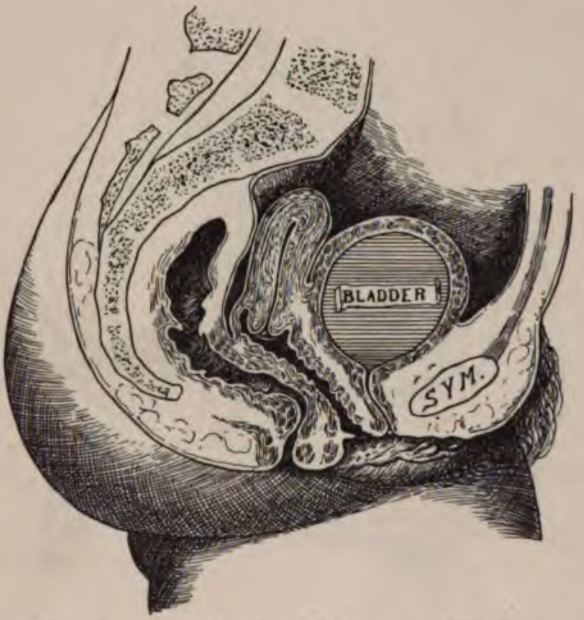

Fig. 320.—Uterus Displaced by Distended Bladder.

402. Physiologic Movements of the Uterus and the Forces by Which It Is Sustained.—The uterus is a freely movable organ. It is slung in the pelvis, together with its fundus, at or a little above the level of the brim of the pelvis, by the action of the uterosacral, the uterovesical, and the inferior portion of the broad ligaments, and occupies the axis of the pelvis, with the cervix directed toward the last sacral vertebræ.

These are not ligaments in the ordinary sense, but are made up of connective tissue, running into and through which are prolongations from the uterine muscular structure, so that the organ is sustained by muscular action. This is evident from the fact that the uterus moves upward and downward with every respiration, changes its position with that of the body, and is influenced by the condition of the surrounding viscera. In the normal position it rests forward upon the bladder in a position of slight anteflexion, with the cervix directed almost at a right angle to the axis of the vagina. This position is markedly changed by distention of the bladder, which raises the fundus upward and decreases the angle between the uterus and the vagina until it becomes an exceedingly obtuse angle ; and, in marked distention, indeed, the uterine axis is nearly parallel to that of the vagina. The cervix is pushed forward by a distention of the rectum. When the rectum and the bladder are both distended, the organ is raised up, and no longer finds room between these two viscera. It will be seen that the arrangement of the muscles just mentioned supports the cervix. The body of the organ is influenced by the broad ligaments on each side, which prevent it from un-

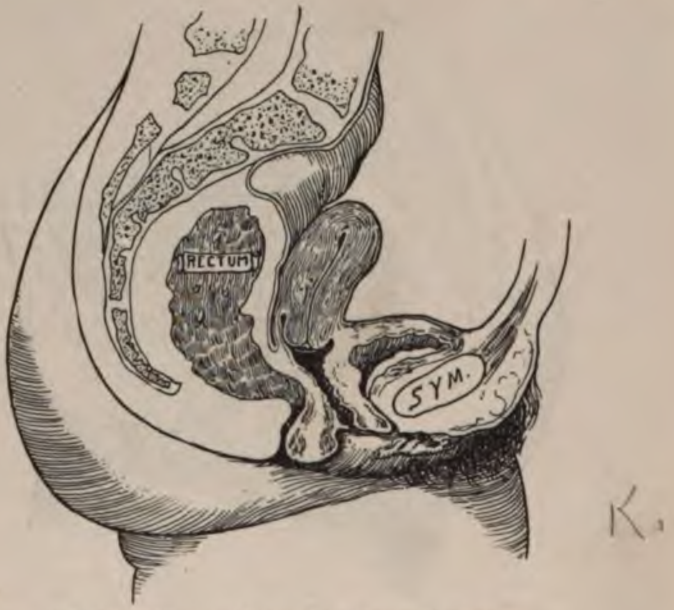

Fig. 321.—Uterus Displaced by Impacted Rectum.

dergoing lateral change of position, and by the round ligaments, which act as stays to prevent its falling backward, or to draw it forward, when the bladder is emptied. The round ligaments are, of course, an insignificant force, but serve to hold the uterus far enough forward to allow the intra-abdominal pressure to be directed upon its posterior surface. So long as the intra-abdominal pressure continues upon the posterior surface of the uterus, it is held forward against the bladder. The normal condition of the muscular structure of the pelvic floor is also important in the maintenance of the uterus in its normal place. Relaxation of the vaginal walls and of the muscular structure, or injury to the pelvic floor by which the perineal muscles are torn through,—and, particularly, the levator ani,—removes a support, which sooner or later favors displacement. The normal condition of the peritoneum is a factor. This structure is certain to be affected by loss of muscular tone and of muscular support. It is not one factor, then, but several, which combine to maintain the uterus in its normal relations.

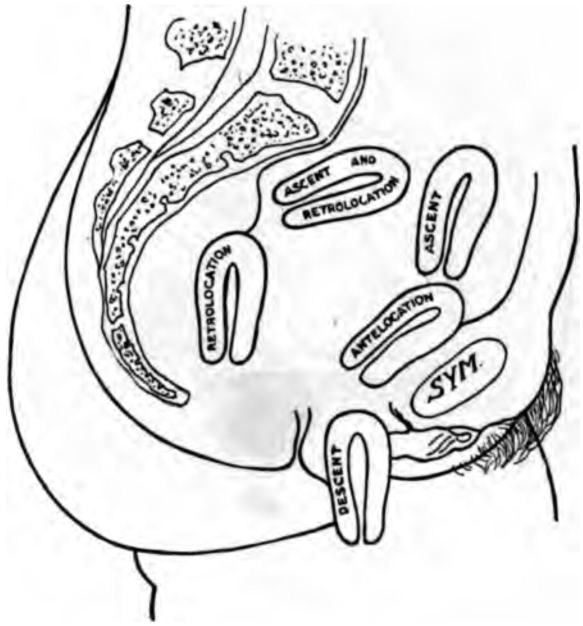

Fig. 322.—Scheme of Dislocated Uteri.—(*Dudley.*)

403. Pathologic Changes and What Constitute Them.—From what has been said of the physiologic changes of position in the situation of the uterus it can readily be understood how difficult it is to draw the line of demarcation between physiologic and pathologic changes. It may be said that when the uterus undergoes such changes in the organ itself or in its enveloping structures that it becomes stable in a position which may, at times, be physiologic, it is pathologic, or a displacement. Thus, the uterus may be pushed upward, increasing the angle between its axis and that of the bladder, by a distended bladder; but if it does not follow the bladder forward when that organ is emptied, the position becomes abnormal.

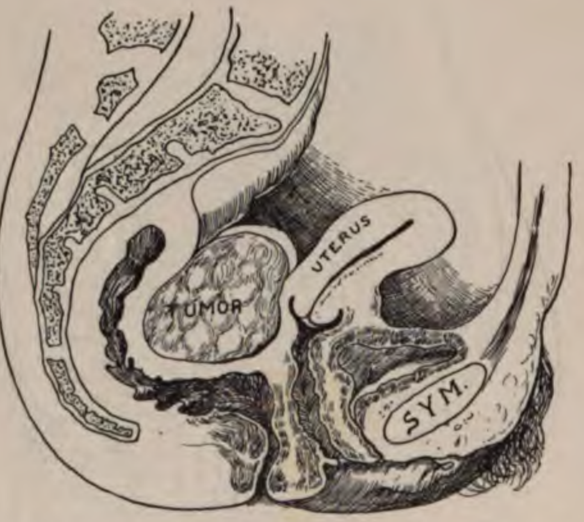

Fig. 323.—Uterus Pushed up by Tumor in Douglas' Pouch.

These changes may result from:

1. Neglect of hygiene on the part of the individual, either in permitting the bladder to become habitually overdistended or the rectum to be loaded with fecal matter until the uterus is so driven back that the intra-abdominal pressure is no longer directed upon its posterior, but falls upon its fundus or anterior surface, leading to changes which produce an abnormal fixation.

2. Inflammatory changes in the uterus itself which lead to its increased weight, to straightening of its body, loss of the normal curvature, and from its weight the organ is situated further forward, and makes pressure against the bladder; or, again, such inflammatory conditions lead to increased weight, with relaxation of the pelvic ligaments, cause its displacement

downward and backward, and the body is bent upon the cervix. This bending may take place either forward, backward, or laterally.

3. The presence of inflammatory conditions in the cellular tissue and in the structures surrounding the uterus, which cause its displacement by the volume of such exudation, and subsequent displacement in the opposite direction through its contraction. The uterus may be displaced as a whole, while its axis still remains parallel to what it was before, causing a change of location; or, again, it may be turned upon its axis forward, backward, or laterally; may be bent upon its own axis; may be depressed downward; and may undergo torsion.

4. The presence of growths, either in the uterus or outside of it.

404. **Classification of Displacements.**—As may readily be inferred from what has been stated in the previous section, the uterus is capable of displacement upward, downward, backward, forward, and laterally, and of being twisted upon its axis. Upward displacement is known as ascent; downward, as descensus or prolapsus uteri. The location of the uterus is subject to change: thus, when it is situated toward the back part of the pelvis, hugging closely the hollow of the sacrum, it is known as retrolocation; close to the symphysis pubis, as antelocation; and toward one or the other side of the pelvis, it is a dextro- or sinistro-location, according to the side on which it is situated. When the direction of the axis of the organ is changed, it is known as a version; with the fundus well forward, it is an anteversion; the fundus turned backward, a retroversion; and toward either one or the other side, a dextro- or sinistro-version. The organ may be bent upon its own axis, in which event the cervix and fundus approach each other. This bending may take place forward, backward, or laterally, giving rise to the terms anteflexion, retroflexion, and dextro- and sinistro-flexion. Finally, it may be twisted upon itself, producing a torsion.

405. **Ascent** is the least frequent form of displacement. The conditions which increase the weight of the organ naturally, by force of gravity, depress it. It is only when the organ has attained a size so great that it is no longer accommodated within the pelvis that ascent occurs. This is recognized as a physiologic ascent in pregnancy, and occurs after the fourth month, when the uterus becomes so large that it can no longer be retained within the pelvis, and rests upon the brim. A similar state develops when fibroid growths are situated in the organ and become large. It is drawn up or pushed up by growths which may have developed in the pelvis and become adherent to the uterus;

as they have increased in size and pushed out of the pelvis, they drag or push the uterus up with them. Ovarian tumors, extra-uterine pregnancy, extensive pelvic exudation, hematocele, and retro-uterine growths may thus give rise to elevation of the uterus.

406. Diagnosis.—The elevation of the uterus is readily determined by digital examination. The cervix is absent from its usual position in the vagina; frequently so elevated as to be with difficulty reached behind or even above the symphysis; frequently a growth or mass fills up the pelvis, over which the cervix can not be reached. Greater difficulty is often experienced in determining the condition which has caused this displacement, and this is as important as the treatment, for the latter is entirely dependent upon the cause producing it.

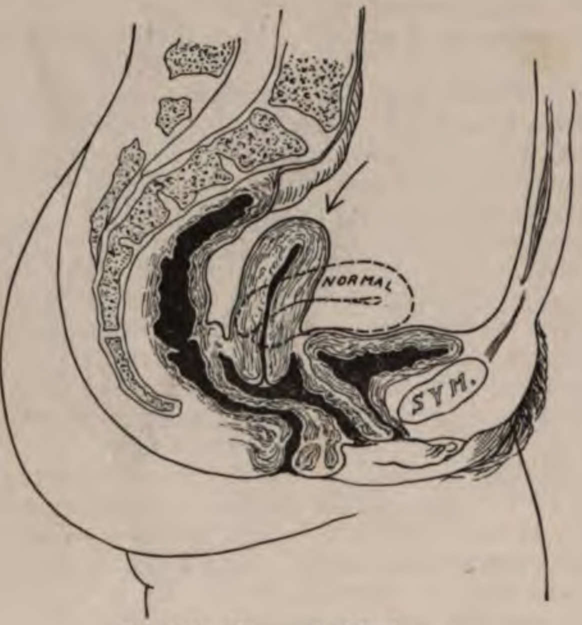

Fig. 324.—Uterovaginal Prolapse.

407. Descent, or Prolapsus.—Descent or prolapsus of the uterus varies in degree. By this term is understood the downward displacement of the organ, which is generally associated with retroversion, so that retroversion is considered as the first degree of prolapsus. The uterus is situated at a lower level, with the os directed in the axis of the vagina. The second degree of prolapsus is when a portion of the organ protrudes through the

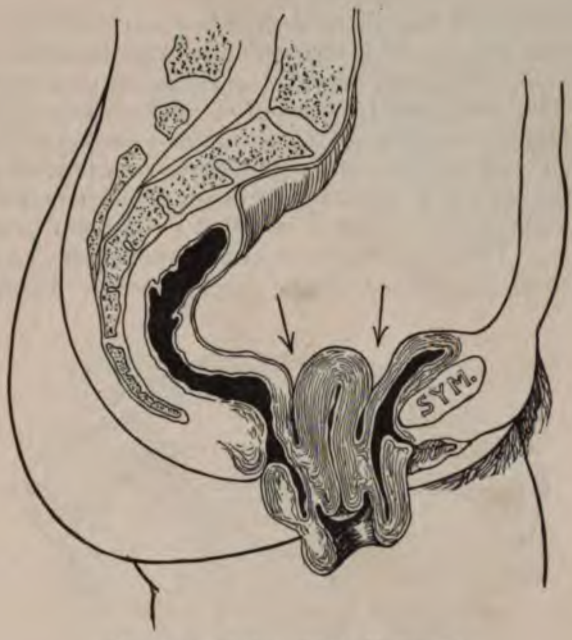

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Fig. 325.—Vagino-uterine Prolapsus.

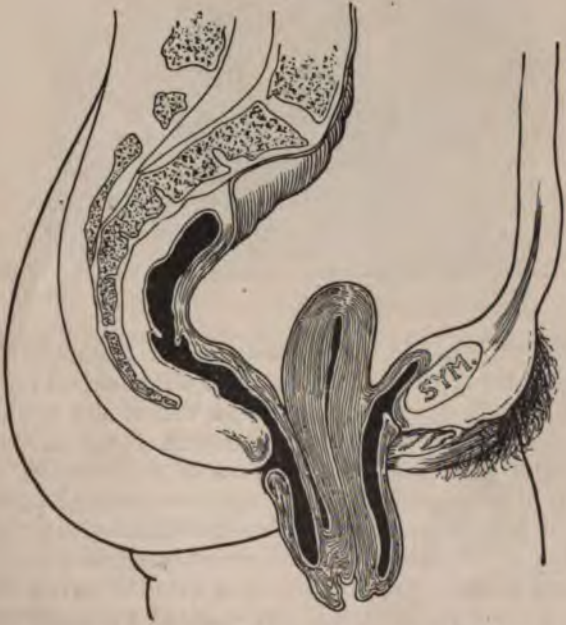

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Fig. 326.—Vagino-uterine Prolapsus with Hypertrophic Elongation of the Cervix.

vulvar orifice, and the third degree is when the entire uterus is outside of the vulva. This term includes a prolapsus or inversion of the vagina. The term procidentia is also applied to prolapsus, but only to those cases in which the prolapsus is divided into complete and incomplete, according to the situation of the uterus. Thus, when the uterus is within the vagina or a portion protrudes through the vulva, it is known as incomplete; when the entire uterus is without the vulva, it is called a complete prolapsus, or procidentia. There are three varieties of prolapsus, according to the relation of the vagina to the displacement. Thus, we have uterovaginal prolapse, in which the prolapsus begins in the uterus, which pushes through the vagina, with only partial inversion of it; second, vagino-uterine prolapse, in which the prolapsus has begun in the vaginal walls and more or less extensive prolapse of the vagina precedes the prolapsus of the uterus. In these cases the prolapsus of the uterus may be incomplete, while the vagina is inverted, producing a hypertrophic elongation of the cervix. The third variety is pseudoprolapsus, in which, while a large portion of the cervix may project into the vulva, the fundus retains its normal position and the vaginal walls are unaffected.

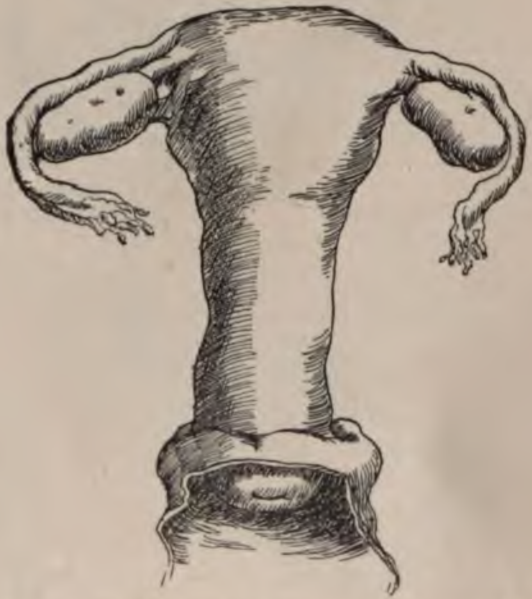

Fig. 327.—Uterus Detached, Showing Hypertrophic Elongation of the Cervix.

In this case the hypertrophic elongation takes place in the intravaginal portion of the cervix.

408. Etiology.—The causes of prolapsus may be classified under: first, decreased support; second, increased weight; third, increased intra-abdominal pressure. These forces can act separately, but usually are in conjunction. Decreased support is characteristic of individuals who have given birth to one or more children, and in whom the pelvic structures have been injured during the process of parturition. Laceration of the perineum or removal of the support of the posterior segment of the pelvic floor permits a protrusion of the anterior wall of the vagina and the bladder during the distention of the latter organ. This protrusion of the anterior segment of the pelvic floor, because of the close attachment of the bladder to the cervix, drags upon the latter, and, unless the uterus is fixed by firm ligaments or inflammatory adhesions, the entire organ is gradually brought into the axis of the vagina, with the fundus thrown backward, and the intra-abdominal pressure directed upon it or its anterior uterine

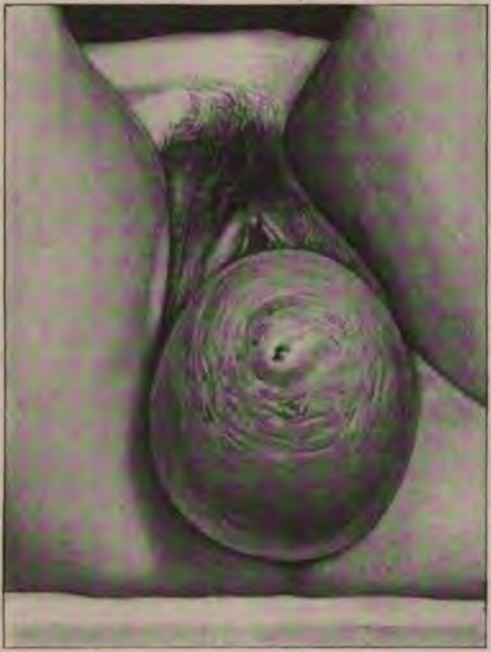

Fig. 328.—Vulvar Appearance of Vagino-uterine Prolapsus.

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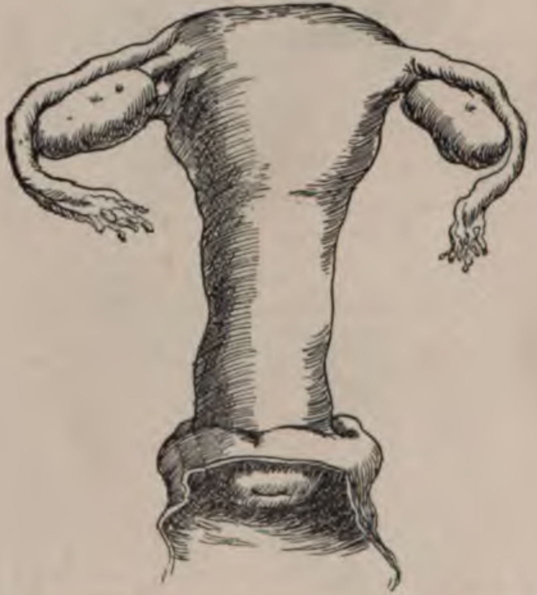

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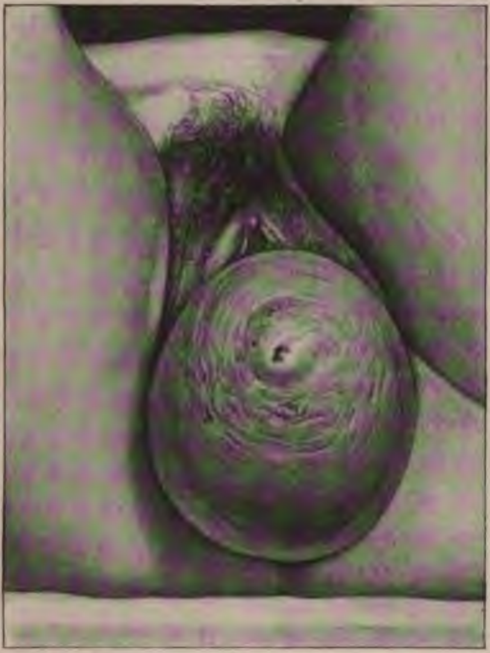

Fig. 328.—Vulvar Appearance of Vagino-uterine Prolapsus.

surface. The decreased support to the posterior wall of the vagina permits pouching of this segment with the rectum, and the cervix is drawn upon by the anterior and posterior vaginal walls. This decreased support may exist in women who have not given birth to children, where, owing to want of normal muscular development and too straight a sacrum, the support is lessened, and the muscles of the pelvic floor are greatly relaxed. If, in such cases, intra-abdominal pressure is increased, extensive displacement results. Prolapsus may thus occur in the unmarried. In marked relaxation and want of pelvic support, which has resulted from lesions of parturition, the tendency to prolapse is increased by enlargement of the uterus or by a want of completion of the process of involution. The uterus remains heavy, so that these two forces, acting in conjunction, lead to descent. It is true, we may have prolapsus when the uterus is small; thus, in cases in which, subsequent to the climacteric, the patient loses flesh, the absorption of the fatty cushion decreases the amount of support, and, with enfeebled muscular action, permits a small

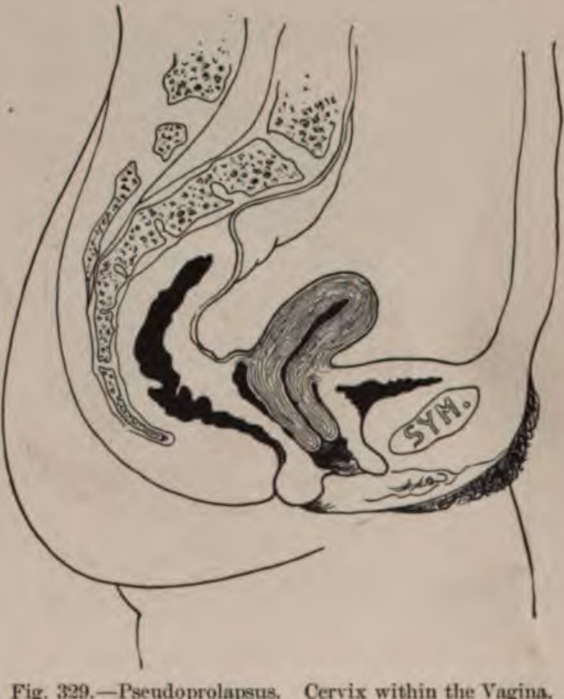

Fig. 329.—Pseudoprolapsus. Cervix within the Vagina.

uterus to be driven through the pelvis. This is a cause of prolapsus in the aged. Increased intra-abdominal pressure may arise from want of hygiene in clothing, where tight corsets and heavy skirts fastened about the waist afford insufficient room in the abdomen for the viscera, which are driven downward into the pelvis. Neglect of the evacuation of the bowels and of the bladder increases the tendency to retrodisplacement and favors driving downward of the organ by straining, carrying heavy weights, and lifting; not infrequently a patient will give a history of having lifted a weight, or of violent straining, after which she had noticed a protrusion from the vulvar orifice. In these cases the condition has existed for some time, and in the majority of cases has been aggravated only at the time of the extra effort. The presence of growths within the abdominal cavity—fibroid tumors, ovarian cysts—which press upon the uterus may drive it down. It is not unusual in pelvic relaxation to find a displacement of the uterus occur as a result of the increased intra-abdominal pressure from the presence of a growth.

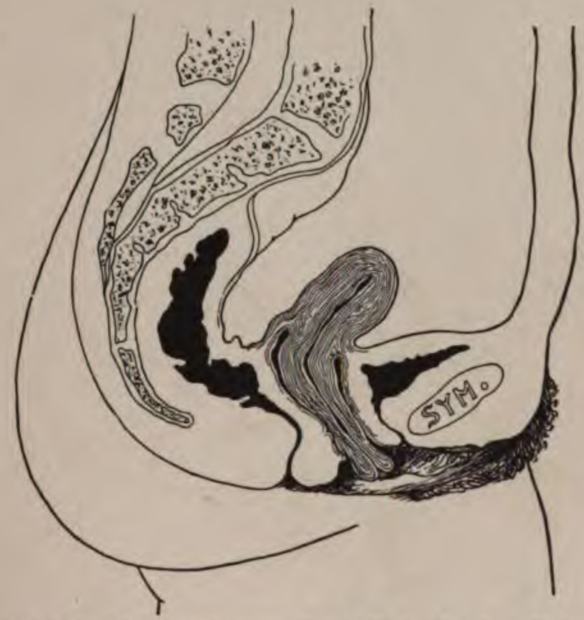

Fig. 330.—Pseudoprolapsus. Cervix Protruding from Vulva.

409. Symptoms.—In the early stages of prolapsus of the uterus there are no symptoms characteristic of the condition. The patient complains of a sensation of weight, pressure, discomfort in the bladder, a feeling of burning in the rectum, dragging sensation while walking or standing—all of which are symptoms which may characterize other conditions. As the condition progresses the patient will notice a protrusion at the vulvar orifice, increased by efforts at straining and lifting. As this protrusion increases, the close association of the bladder with the cervical wall leads to its being dragged down with the prolapsus. Cases are exceedingly rare in which the bladder is not thus displaced. Occasionally, the peritoneal fold may be driven down between the bladder and the uterus, and a prolapsus occur without the bladder being associated with it. These are very exceptional cases. As the prolapse continues, the anterior wall becomes more and more everted; not infrequently a considerable sized tumor is projected

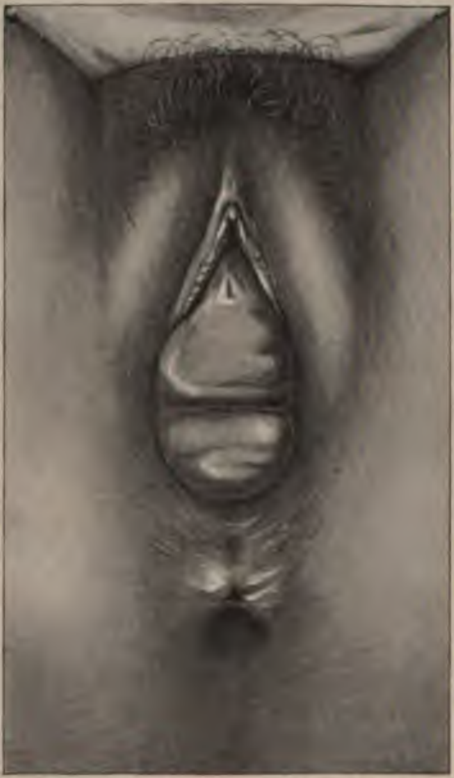

Fig. 331.—Anterior and Posterior Colpocele.

anteriorly, which increases upon straining and forms a tumor with a smooth, globular surface. This is the protrusion of the anterior wall of the vagina and bladder, known as a cystocele. The posterior wall of the vagina may also be protruded with the tumor, though less frequently than the anterior. In cases of inversion of the vagina the posterior is associated, although even then not to the same degree as the anterior wall. The posterior protrusion is known as a rectocele. The uterus is separated from the rectum by a prolongation of the peritoneum which extends below the rectum on the posterior wall of the vagina. In the inversion of the posterior wall of the vagina to form a rectocele, the

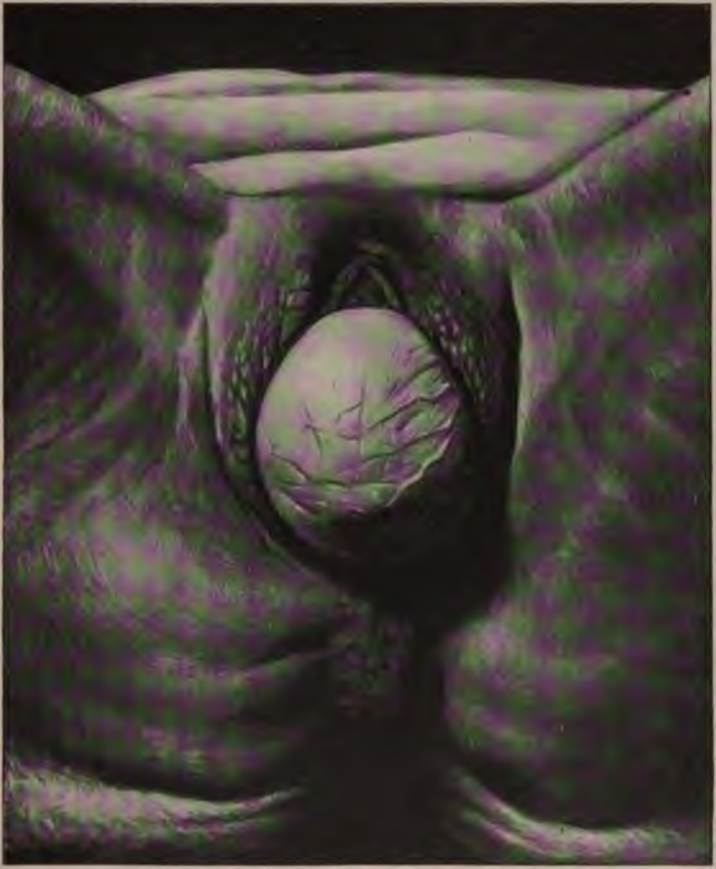

Fig. 332.—Cystocele.

intestine may or may not be associated with it. Occasionally, the want of support of the anterior rectal wall permits it to be pushed downward, and to form a diverticulum considerably below the anus, which renders the evacuation of the bowel difficult, and at times requires the bowel to be pushed up with the hand in order to accomplish the evacuation of scybalous masses which are situated in this pouch. In complete prolapsus of the vagina with formation of extensive cystocele a portion of the bladder is situated below the level of the internal orifice of the urethra, and as this protrusion extends, the bladder is incompletely evacuated, the urine with mucus in this reservoir undergoes decomposition, forming ammoniacal urine, which irritates the mucous membrane of the bladder and produces a cystitis. In this diverticulum, with a plug of mucus as a nucleus, a calculus of con-

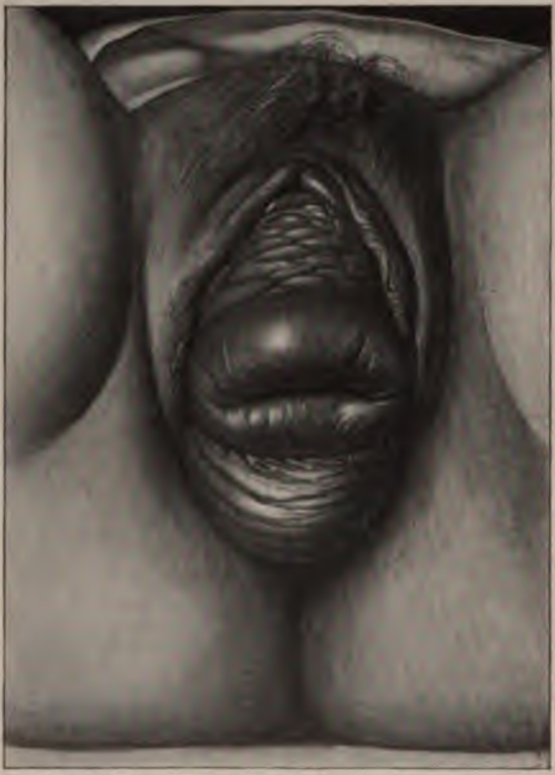

Fig. 333.—Prolapsus, with Both Rectocele and Cystocele.

siderable size can form; indeed, one weighing an ounce has been found in such a sulcus. With the protrusion the distress of the patient is greatly increased, because of the bladder irritation and the friction against the clothing and limbs of the patient of the protruding tumor. The urethra, instead of passing upward and backward as in the normal situation, passes backward, and even downward. The protruded vagina in a complete prolapsus may form a large tumor extending half way to the knees, in which tumor is situated a portion of the bladder, the uterus, ovaries, tubes, and prolapsed intestines—an extensive hernia. The mucous membrane of the vagina loses its moistened, reddish appearance, becomes pale, thickened, covered with flakes of epithelium, and resembles the appearance of the skin. Bathed with urine and fecal matter, irritated by the clothing and by friction against the limbs, and congested from the decubitus, ulceration is produced upon the external os and upon the sides of the tumor, which, at times, causes extensive ulceration and adds greatly to the discomfort of the patient. In the early stage of the displacement the menses are increased, possibly irregular, and occur at shorter intervals. Leukorrheal discharge is present, often profuse, as a result of the congestion of the organ. As the prolapsus becomes more extensive, and approaches nearer to complete pro-

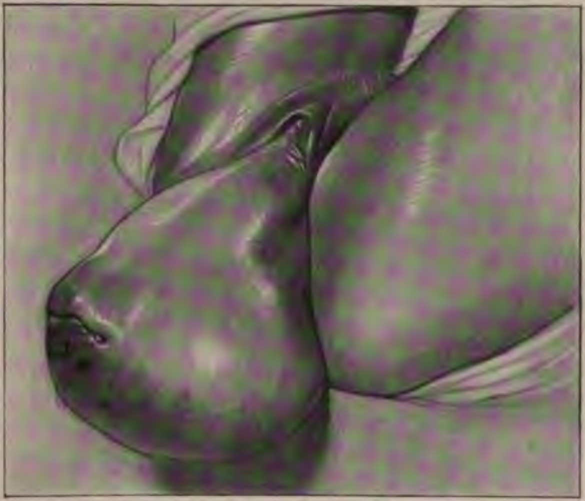

Fig. 334.—Irreducible Prolapsus. The Tumor Contained Uterus and a Large Pyosalpinx. Ulceration of Cervix.

lapsus, menstruation is likely to be decreased and the leukorrheal discharge disappears. The displacement does not necessarily interfere with conception, as pregnancy has often occurred with complete prolapsus; but in the later stages the patient is more likely to be sterile.

410. Diagnosis.—Every protrusion from the vulva the patient believes to be a prolapsus or falling of the womb. The diagnosis would seem self-evident, but it must be conceded that not every such protrusion is necessarily a prolapse of the uterus, and it is important to determine the degree, the form of prolapsus, and the structures involved. This knowledge is obtained by inspection, while the patient is directed to increase the intra-abdominal pressure, to strain, and to bear down, and is further confirmed by touch. A protrusion of the anterior part of the vulva which,

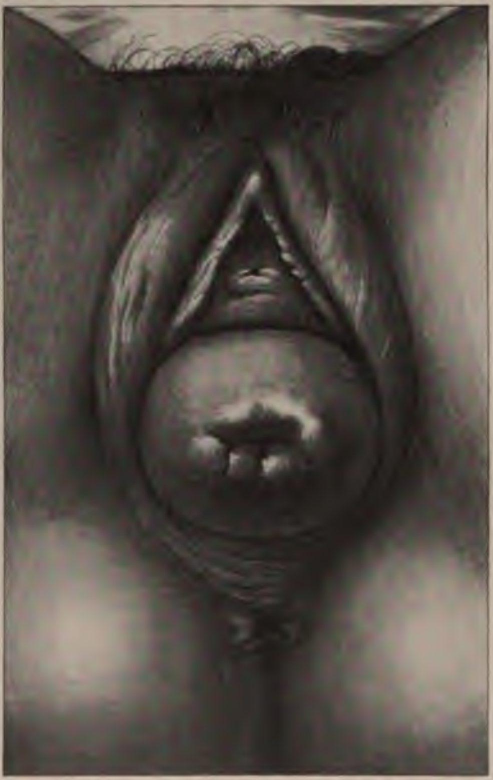

Fig. 335.—Prolapsus without Protrusion of Vaginal Walls.

in separating the labia, is found to be continuous with the urethra and anterior wall is a cystocele. The uterus may be partly prolapsed. Cystocele is recognized by the finger entering the vagina behind the protruding mass, which can generally be replaced with ease. The cervix can be situated at its posterior surface. A protrusion of the posterior wall of the vagina is recognized by the finger entering the vagina in front of it. This protrusion may be quite extensive without the uterus being much displaced. The degree of displacement of the anterior and posterior walls of the vagina is recognized by the introduction of the finger around the uterus. Thus, the cervix can protrude from the vulva without there being any shortening of the posterior, and but slight shortening of the anterior, wall of the

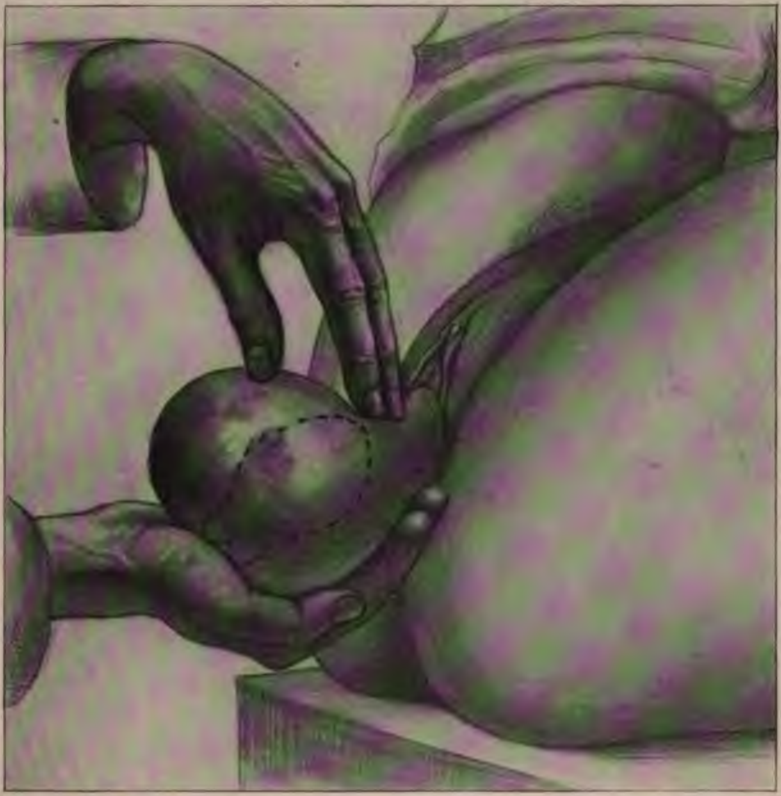

Fig. 336.—Determination of the Position of the Uterus by Bimanual Palpation.

vagina. With inversion, or complete prolapse of the vagina, the summit of the protrusion is occupied by the cervix, which can appear as the normal sized opening, or external os; or, when laceration of the cervix has occurred, the lips may be widely everted, and show an irritated cervical mucous membrane. When prolapsus is complete, the uterus is situated in the tumor, external to the vulva, generally in the position of retroversion or retroflexion; rarely it is anteflexed. The uterovaginal form of prolapsus is determined from the vagino-uterine variety by the lessened involvement or association of the vagina with the protrusion. In the uterovaginal form the uterus is driven through the vagina, drags with it the upper part, and finally results in partial inversion of the canal. When the prolapsus is complete, the uterus is likely to be small and its cavity short. In the vagino-uterine variety the prolapse has begun at the lower segment of the vagina in a rolling outward of the anterior and posterior walls. The thickened and everted vaginal walls drag upon the cervix, and lead to displacement of the uterus; or, where the fundus is fixed by the condition of its ligaments

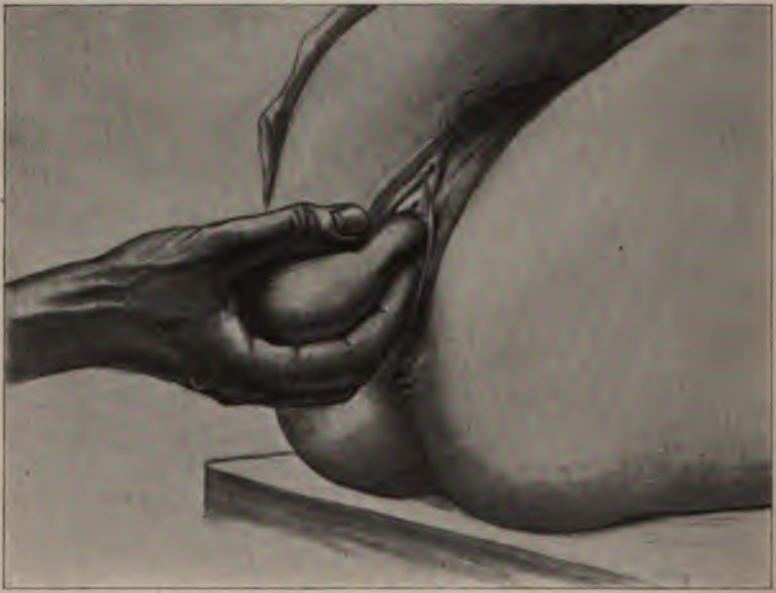

Fig. 337.—Recognition of Uterus with Thumb and Fingers of One Hand.

or by inflammatory disorders, the cervix is drawn out, and causes a very marked elongation of the uterus. This condition is determined by placing the fingers of one hand in front of, and those of the other hand behind, the protruding mass, when we determine the situation of the fundus of the uterus. It can be situated externally, or an elongated cord may connect it with the cervix. The situation of the fundus can still further be recognized by the introduction of the finger into the rectum. By dragging upon the cervix with a tenaculum while passing the finger into the rectum the attenuation of the neck is determined, and the situation of the fundus is recognized. In pseudoprolapsus the fundus is but little displaced from its normal situation. There is a protruding mass from the vulvar orifice, and the introduction of the finger into the vagina shows that the vaginal walls are not displaced; this elongation has taken place in that portion of the cervix which is situated below the vaginal attachments. It generally results from enlargement and increased weight of the cervix. The anterior segment of the vagina is

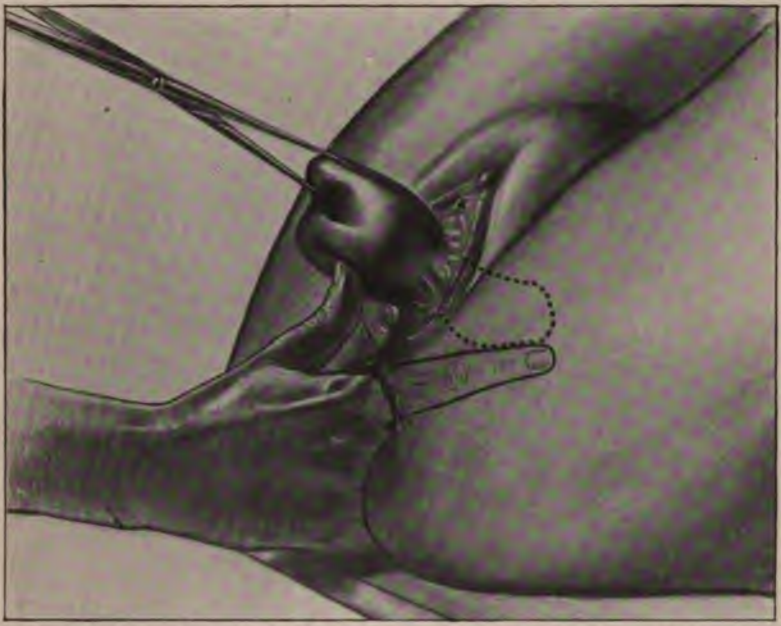

Fig. 338.—Diagnosis of Position of the Uterine Body by Rectal Touch.

attached to the cervix at a lower level than the posterior. Occasionally, we find a protrusion of the anterior wall of the vagina, and at its posterior surface the cervix, while the introduction of the finger into the vagina shows that the posterior vaginal wall is not displaced. In other words, the elongation has occurred in that portion of the cervix situated between the attachment of the anterior and the posterior walls.

In considering the differential diagnosis we must concede the possibility of the protrusion having arisen from a cyst in the anterior wall of the vagina, a hernial protrusion through the posterior fornix, fibroid polypus, and inversion of the uterus, associated with inversion of the vagina. Cyst of the vagina is recognized by bimanual palpation. A catheter or sound is introduced into the bladder, and a finger into the vagina, by which the abnormal thickness of the anterior wall is readily recognized and the character of the condition disclosed. The bimanual can reveal a fibroid polypus protruding from the orifice of the cervix by a more or less distinct pedicle. Traction upon the tumor and

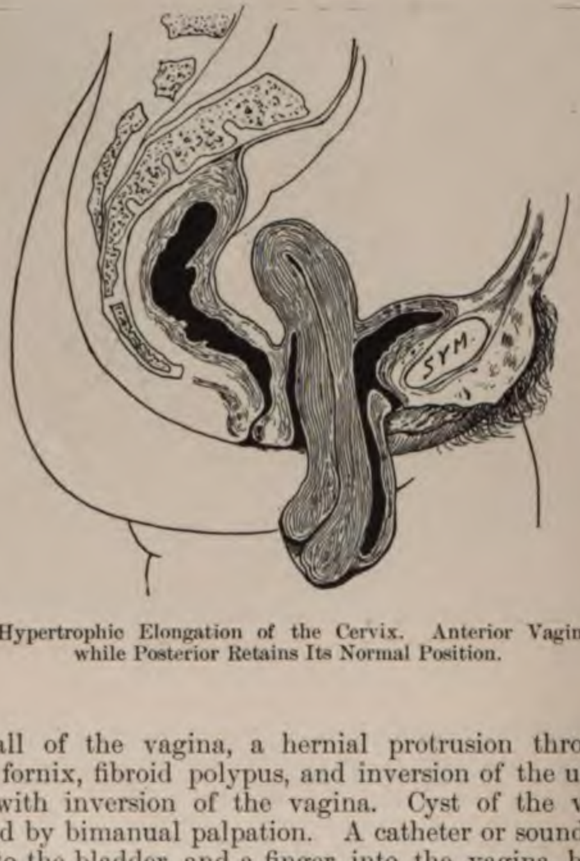

Fig. 339.—Hypertrophic Elongation of the Cervix. Anterior Vagina Everted, while Posterior Retains Its Normal Position.

the introduction of a finger into the rectum will disclose the position above of the uterus. Displacement of the rectum is not generally associated with prolapsus of the vaginal walls, and, when so, is less intimately connected. Inversion of the uterus is recognized by a protruding tumor, which does not present an external os, is more sensitive, under careful examination shows the orifices of the Fallopian tubes, and is a globular, well-shaped tumor, which can, still further, lead to an inversion of the vagina in which the relation of the cervix to the tumor and the vagina is readily determined.

Enterocele, or hernia through the posterior fornix of the vagina, is a rare condition. The tumor is generally more elastic and is greatly distended. The absence of the uterus, in association with it, is recognized. On reduction of the tumor the opening into the posterior fornix, through which it had passed, is readily recognized.

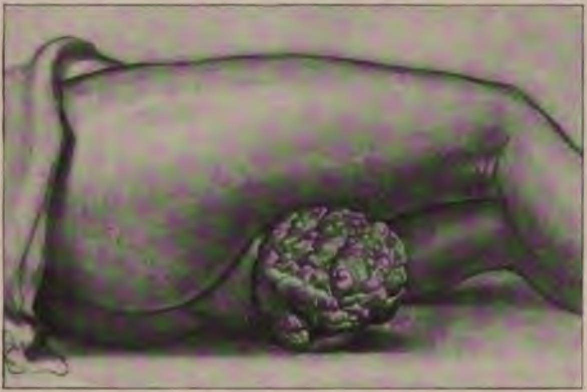

Fig. 340.—Vagino-uterine Prolapse Complicated by Proliferating Epithelioma.

411. Urethrocele.—An involvement of the urethra in complete inversion of the vagina is common, as has already been recognized ; a segment of the bladder is situated below the internal orifice of the urethra, and the upper part of the urethra, as a consequence, becomes prolapsed. The lower segment of the urethra, however, retains its normal situation. Occasionally, we may have a protrusion of the central portion of the urethra, forming a sac-like projection at the lower portion of the anterior wall of the vagina which may be independent of any uterine or vaginal displacement. This segment, on introduction of the catheter, is found to be a part of the urethra. It is so extensive, at times, as to form a kind of diverticulum, over which the urine flows, without entering it, or only to a limited extent. Pressure upon the urethrocele causes a discharge of quite profuse purulent material, although pus has not previously been found in the urine. The treatment consists in dissecting out the sac, a catheter having been previously introduced as a guide. The opening in the urethra is closed while the catheter is in place. The vaginal wall is then sutured over this wound, and the urine is subsequently evacuated through a permanent catheter for two or three days.

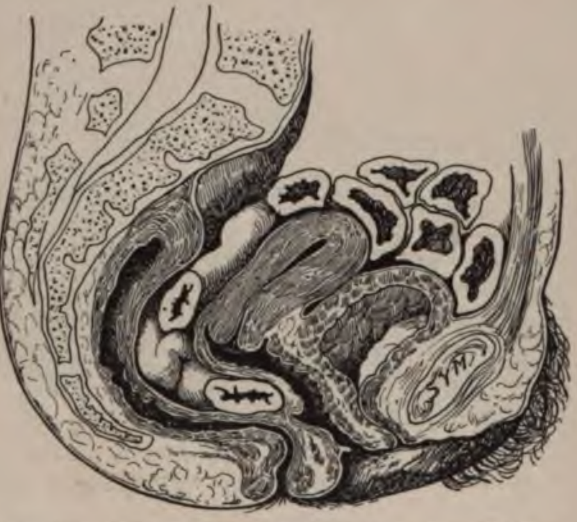

Fig. 341.—Enterocele through the Posterior Vaginal Fornix.

412. Dislocation of the uterus is a displacement in which there is but slight change in its axis. These dislocations may be forward, backward, or lateral. The organ is more or less fixed in the abnormal position by inflammatory changes, frequently in the form of inflammation of the cellular tissue. In *anteposition* the uterus is situated close to the symphysis, generally above it, and the condition is produced by growths or accumulations in the pelvis which push up the uterus. The organ once fixed in the abnormal position, remains. In *retroposition* the uterus is situated at a lower level, and close to the hollow of the sacrum. It results from inflammatory changes which contract, and fix the organ; thus, a hematocele in its earlier stages may have pushed the uterus forward into a state of anteposition, but later, as the collection becomes absorbed and organized, contractions occur, by which the organ is drawn backward. When the contraction is situated in the region of the folds of Douglas or in the uterosacral ligaments, the fundus of the organ will be pushed forward, and will remain as an anteflexion. It is only when the organ has previously been the seat of metritis and has become so rigid that it resists the tendency to flexion that it retains the retroposed position.

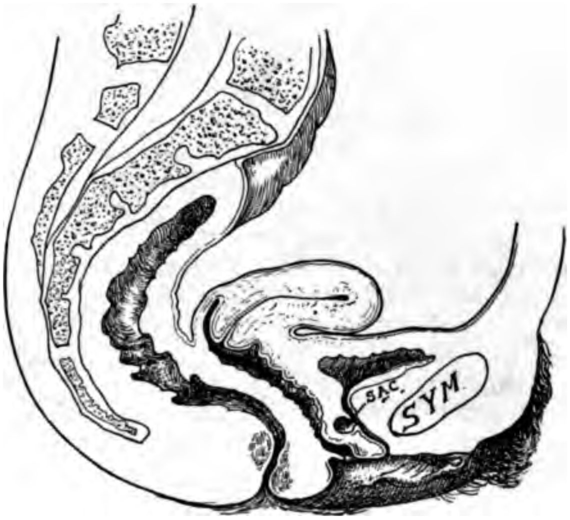

Fig. 342.—Urethrocele.

Lateral position, either right or left, is generally due to inflammation in the cellular tissue of the broad ligament. In the acute stage of exudation the organ may be pushed to the side opposite to that on which the exudation occurs. As it becomes chronic, and contracts, the uterus is drawn to the affected side. These displacements cause no special symptoms. The symptoms, when present, are due to the complications or conditions which have produced the displacement rather than consequent upon it.

413. Diagnosis.—The position of the displaced organ is determined by bimanual examination. The fixed position and situation are usually sufficient for its recognition. In lateral displacements the organ is not in the median line, and will move more readily toward the affected side. In women with fat or resistant abdomens the posterior dislocation is more difficult to differentiate from retroversion. The introduction of the sound would afford information, but the advantage derived from determining the position is insufficient to compensate for the danger from its use. An assistant dragging upon the cervix with a tenaculum or vulsellum while either the vaginal or rectal bimanual is practised will generally afford a definite determination of the position.

414. Torsion.—Torsion is generally associated with either a retroposition or a lateral position, and is due to an irregular contraction of the portion of the broad ligament which has been subject to cellular inflammation. This contraction results in twisting the uterus upon its axis, so that the cornua of the uterus may be turned anteroposterior instead of being laterally situated. The entire uterus can be thus twisted, so that, upon inspection, the os, instead of being transverse, will present oblique or nearly anteroposterior line. Torsion also results from the presence of growths in one or the other broad ligament or of an ovarian tumor to which the tube is adherent. As the tumor enlarges it drags upon the uterus and twists it. This lesion is frequently overlooked, and presents no symptoms of special importance.

415. Anteversion.—Anteversion is a rotation forward of the uterus. The normal flexion, as a result of changes in the organ, has disappeared. The organ is straight, with its fundus resting upon the bladder or forward toward the symphysis, while the cervix is turned backward toward the rectum, or, in marked anteversion, can look upward. This position of the uterus is caused by increased weight. The organ is large, and may be fixed in the abnormal position by complications, as in inflammation existing between the fundus and the anterior peritoneum, or, more frequently, in the cellular tissue about the cervix and in the uterosacral ligaments. Such an inflammation complicating a normal uterus would produce flexion; but when the organ is stiffened by inflammation, it causes anteversion.

416. Etiology.—Any disorder which increases the weight of the organ increases the tendency to antedisplacement. When the uterus has been the site of previous inflammation, particularly a metritis, this displacement is necessarily an anteversion. Metritis, subinvolution of the uterus, pelvic cellulitis, occurring in the posterior portion and in the uterosacral ligaments; fibroid growths in the fundus; ovarian growths—all may cause this form of displacement.

417. Symptoms. — Anteversion presents no characteristic symptoms. The symptoms are those which are associated with the complication by which it is produced. The patient may complain of a sensation of distress, from pressure upon the bladder, of frequent micturition, and of pain or a dull ache over the region of the symphysis.

418. Diagnosis.—Anteversion is readily determined by bimanual palpation. The cervix is situated high posteriorly, often reached with some difficulty, while the uterine body can be traced forward and rests upon the bladder. Not infrequently the fundus lies well against the symphysis. The fundus discovered in the anterior portion of the abdomen, the absence of any angle in the uterus, and its size, weight, and more or less immobility, definitely differentiate it.

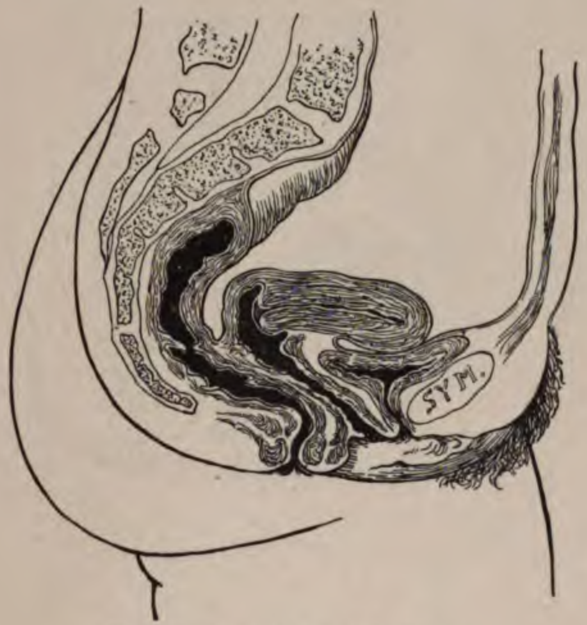

Fig. 343.—Anteversion of the Uterus.

419. Retroversion.—In retroversion the uterus is turned with the fundus backward. The cervix is directed forward against the posterior wall of the bladder. This displacement varies in degree according to the relations of the cervix and uterus to the axis of the vagina. The maximum degree is a backward displacement in which the fundus lies low in the hollow of the sacrum, with the cervix directed upward. Retroversion is recognized as an early stage of prolapsus. With this displacement the intra-abdominal pressure is directed upon the fundus or upon the anterior wall of the uterus, which increases the downward displacement, so that we usually find retroversion associated with a certain amount of descent of the uterus.

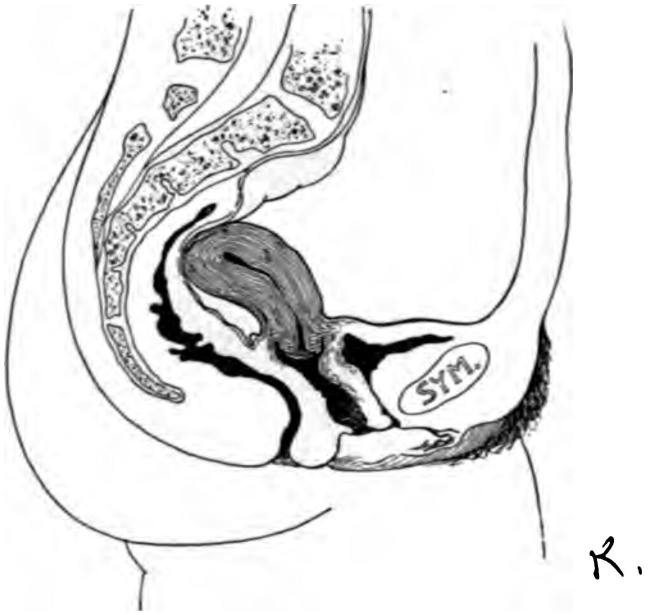

Fig. 344.—Retroversion.

420. Etiology.—The most frequent cause of retroversion is a lesion of pregnancy. Retroversion occurs in the unmarried or sterile woman, but is much less frequent. It is produced by decreased support of the ligaments, particularly of the utero-sacral, which permits the uterus to sag downward and to be rotated backward; the latter action is enhanced by a distended bladder, until the organ does not regain its normal position. Retroversion can be produced by traumatism, as when the person falls from a height and strikes upon the feet or, particularly, upon the buttocks, and by the presence of growths in the uterus or in the ovaries.

421. Symptoms.—Retroversion causes few symptoms. The discomfort in the majority of cases arises from complications. Patients may have marked retroversion without experiencing any inconvenience or being aware of the condition until it is brought to their knowledge. Inflammatory complications produce a sensation of weight or dragging, as if everything were about to protrude when the patient stands or walks. The menstrual flow is increased, producing menorrhagia; occasionally, there is an irregular, bloody discharge, or the intermenstrual intervals are shortened, or, as a result of the coexisting catarrh, the patient will have a profuse leukorrhea. The projection backward of the fundus and pressure of the cervix against the bladder cause a more or less frequent desire to urinate. Not infrequently there is an extension of the inflammation to the vesical mucous membrane, which produces cystitis. Pressure of the uterus upon the rectum increases the tendency to constipation, interferes with the rectal circulation, and develops hemorrhoids and fissure of the anus. An injury of the anus or rectum under these circumstances is slow to recover, which makes it important, in cases of rectal disease, to ascertain the condition of the uterus before we resort to any operative interference.

422. Diagnosis. — Digital examination discloses the cervix uteri in the axis of the vagina, or looking forward; the finger passed along the posterior fornix of the vagina discloses a mass, which is continuous on a straight line with the cervix. With the bimanual examination the absence of the fundus from the anterior fornix is disclosed. With the rectal bimanual the fundus, and even the anterior surface of the uterus, can be explored.

423. Lateral Version.—Lateral version is a form of displacement in which the fundus is situated to one side of the pelvis, while the cervix is directed toward the other. This condition is produced by cellulitis of the broad ligament, and by intraligamentary growths, either fibroid or ovarian; in marked cases of inflammation contraction can occur in the base of one broad ligament, and in its upper part on the opposite side. This produces a fixation of the uterus directly transverse to the pelvis, not unusually with a certain amount of torsion. The lateral version causes no special symptoms, and is readily recognized by the bimanual palpation.

424. Anteflexion.—In anteflexion the uterus is bent upon its axis, with the fundus forward, while the cervix lies more or less in the axis of the vagina. The flexion may be slight—but little more than normal; indeed, any flexion which is fixed is an abnormal one, even though it may not be greater than the ordinary bending of the uterus. From a slight flexion we may have a very acute one, in which the fundus and cervix seem to lie upon each other at a very acute angle. The anterior wall of the uterus, at the point of flexion, undergoes a change in which there is a substitution of fibrous tissue for the muscle-wall. The posterior surface becomes exceedingly thinned where it bends over the anterior. The anteflexion may be mobile or immobile. The former results from a heavy fundus when the cervix is in a more or less fixed position. Raising the fundus, we can tilt it backward, and leave the uterus in a position of retroflexion, so that at times the organ is anteflexed; at others, retroflexed. Not infrequently a diagnosis of anteflexion will be made, and at a subsequent examination by another person the uterus is found retroflexed. If the fact that the organ is mobile is not remembered, an error in diagnosis will be attributed to the first investigator. In the immobile uterus the flexion is fixed. Anteflexion, again, may be regarded

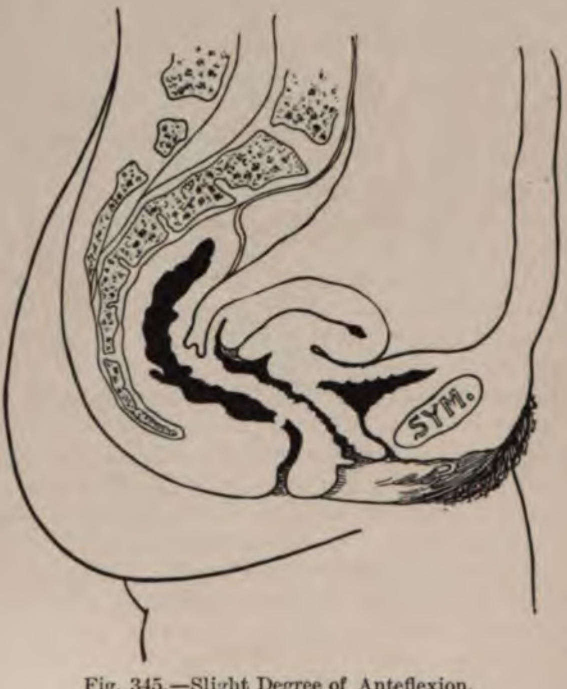

Fig. 345.—Slight Degree of Anteflexion.

as physiologic, pathologic, and indifferent. A physiologic anteflexion is one which corresponds to the normal condition of the

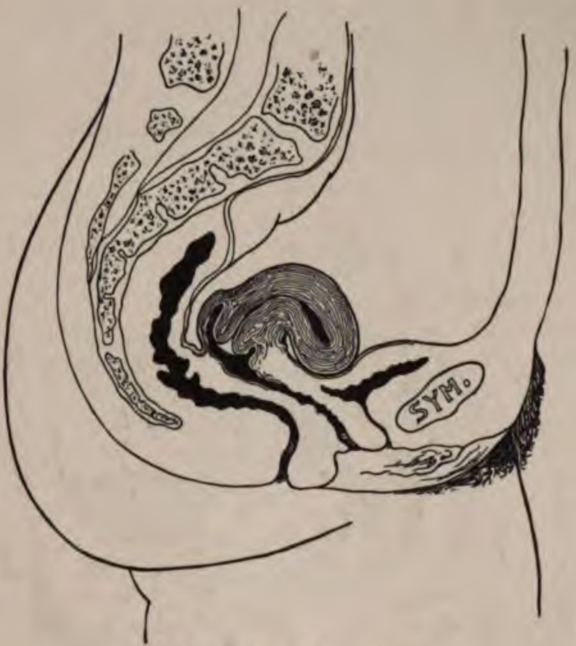

Fig. 346.—Acute Anteflexion.

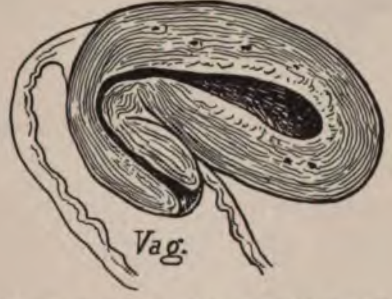

Fig. 347.—Section Showing Thinning of Cervical Walls at the Angle of Flexion.

uterus; a pathologic, one in which the flexion is more or less fixed or is greater than normal; while in an indifferent anteflexion the bending causes no symptoms.

425. Etiology.—Anteflexion is probably next to the most frequent form of displacement of the uterus, as it occurs less frequently than do the retrodisplacements. It is more frequently found in the unmarried or nulliparous woman, and can result from congenital conditions, or, rather, from those which are associated with the earlier development of the uterus. When the uterus retains the long cervix of the puerile organ, the situation of the latter in the vagina causes, first, the fundus to bend forward over it. Second, inflammation in the uterosacral ligament or in the cellular tissue posterior to the uterus, which draws the cervix upward, promotes, in a flexible body, its falling forward, and the angle between the body and the cervix is increased. Third, the displacement arises from localized inflammation in the site of the placenta, which was situated upon the posterior uterine wall. Involution is more rapid in the anterior, and the shorter wall becomes the string of the bow which bends the uterus forward. Fourth, anteflexion is produced by growths in the fundus of the uterus.

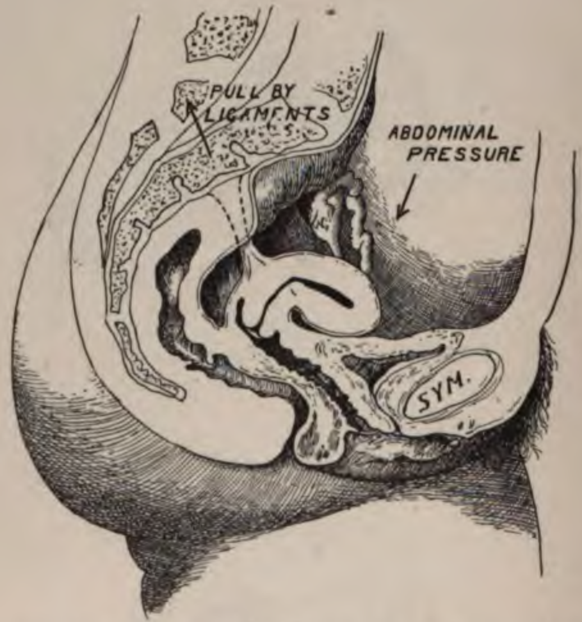

Fig. 348.—Anteflexion Associated with Contraction of Uterosacral Ligaments.

426. Symptoms.—The symptoms most frequently attributed to anteflexion are sterility and dysmenorrhea; but when uncomplicated by inflammation, neither of these symptoms is necessarily present. The patient with marked anteflexion generally suffers from chronic vesical distress. Pain occurs when the bladder is moderately distended, micturition is frequent, and generally there is a sensation of distress and annoyance, which follows the evacuation. These symptoms, however, are not infrequently produced by inflammation in the bladder, so that, as a rule, the urine should always be carefully examined. Dysmenorrhea has been attributed to an obstruction of the canal from which there is an accumulation of material within the uterine cavity, and the organ has to go into labor to displace it. As flexion does not cause dysmenorrhea when the lesion is uncomplicated by inflammation, it is evident that the latter is the cause of the symptom, and that the hyperemia prior to and coincident with menstruation produces pain during the distention of the inflamed surfaces rather than an obstruction of the canal. Even in the congenital conditions the dysmenorrhea does not occur with the first menstruation, but later, when there is distinct evidence of the development of inflammatory trouble.

427. **Diagnosis.**—Flexion is recognized by digital and bimanual palpation. The cervix is situated in the axis of the vagina, and, by carrying the finger in front of it, a body is felt in the anterior fornix of the vagina, between which and the cervix a distinct angle is recognized. In bimanual palpation this angle can to some degree be straightened, and the relation of the flexion to the cervix and body is more distinctly recognized. The flexion is particularly determined by passing the index-finger into the lateral fornix, first upon one side and then upon the other; by pressing from above we are able to recognize the lateral borders of the uterus and the absence of any growth. We can be in doubt as to whether the mass found in front is the fundus uteri or a fibroid growth attached to the anterior wall. Each may afford an equal sized angle. The method we have already described, of passing the finger along the lateral aspect of the uterus, will enable us to differentiate them. By changing the position of the organ, and pressing it well forward with the hand over the abdomen, we can outline the posterior surface of the fundus, and determine that its size and relations correspond to those of the cervix to the fundus, rather than to a growth. When the uterus is fixed, bimanual palpation is difficult. The position of the organ can be determined by the introduction of a uterine sound into the canal. The use of the sound, however, under these or any other circumstances, is fraught with so much danger that it is preferable to administer, if necessary, an anes-

thetic for the further practice of the bimanual, rather than to make an intra-uterine exploration.

Rectal palpation with the digital finger, while the thumb of the same hand is placed in the vagina against the cervix, and the other hand over the abdomen, enables us to bring the uterus definitely under observation.

428. Retroflexion.—In retroflexion the fundus is bent backward upon the uterine axis, and, according to its degree, lies toward the rectum or is forced well down into Douglas' pouch. The cervix is in the axis of the vagina. The retroflexion may be mobile or immobile, may be pathologic or indifferent, but can never be said to be physiologic. This form of displacement is very frequently a sequel of version. The uterus becomes retroverted and the abdominal pressure then drives the fundus downward, bending it upon its axis, forcing it into Douglas' pouch.

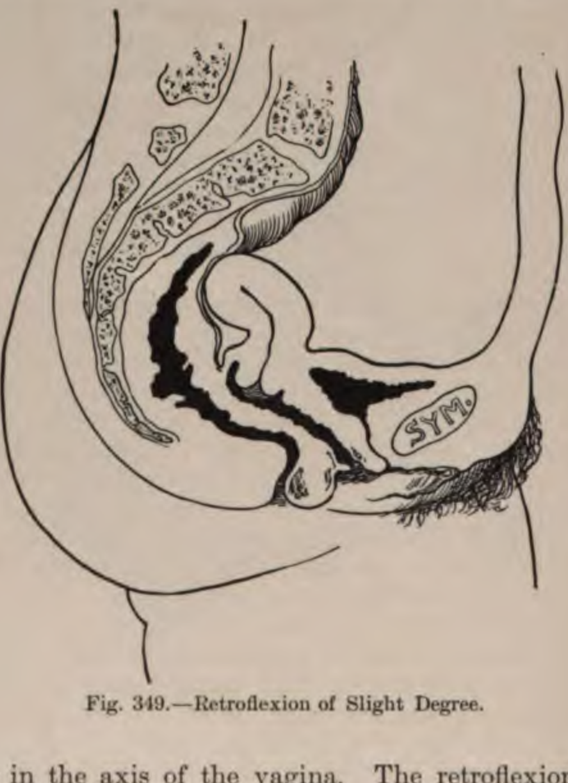

Fig. 349.—Retroflexion of Slight Degree.

429. Etiology.—Retroflexion is produced by metritis; subinvolution; inflammation of the placental site, in the anterior wall of the organ; fibroid growths in the fundus or anterior uterine

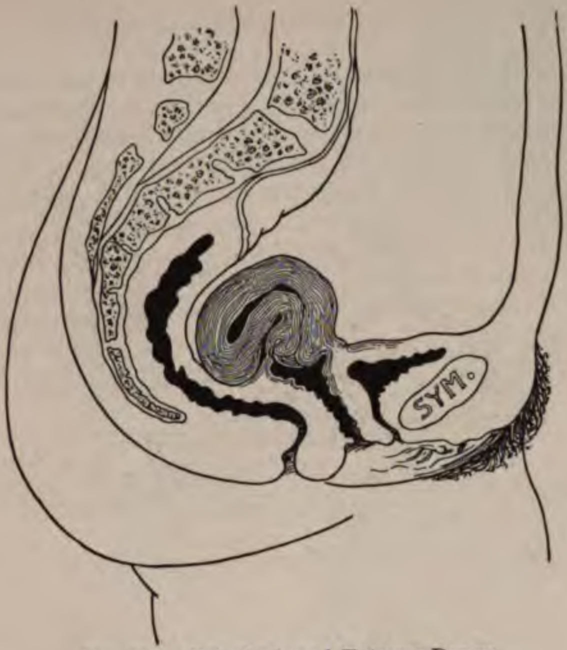

Fig. 350.—Retroflexion of Extreme Degree.

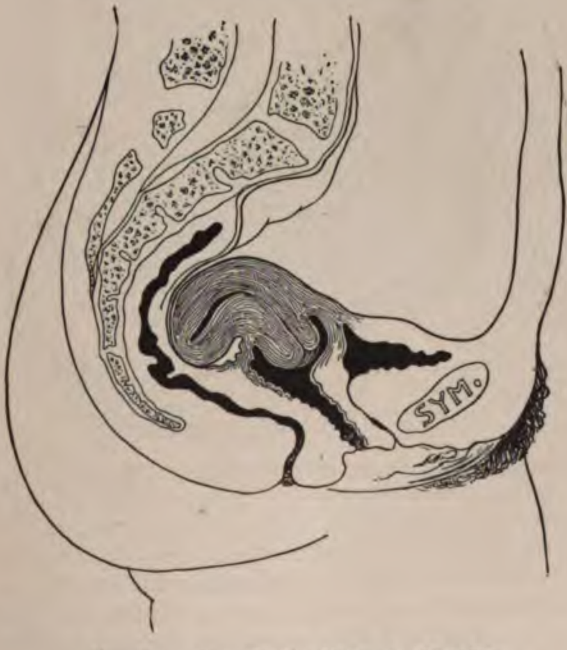

Fig. 351.—Retroflexion Following Version.

wall; parametric inflammation, or cellulitis of the anterior segment of the pelvic floor, which draws the cervix forward; localized peritonitis; or contraction following hematocele, by which the fundus of the organ is drawn backward.

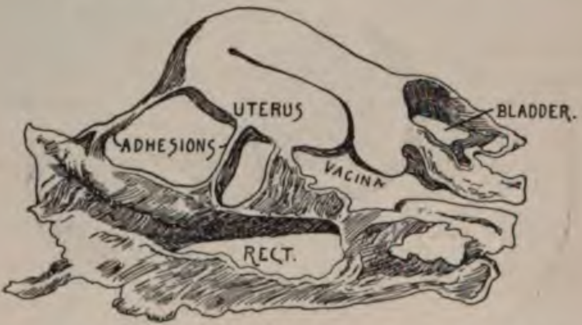

Fig. 352.—Retroversion the Sequel of Inflammatory Adhesions.

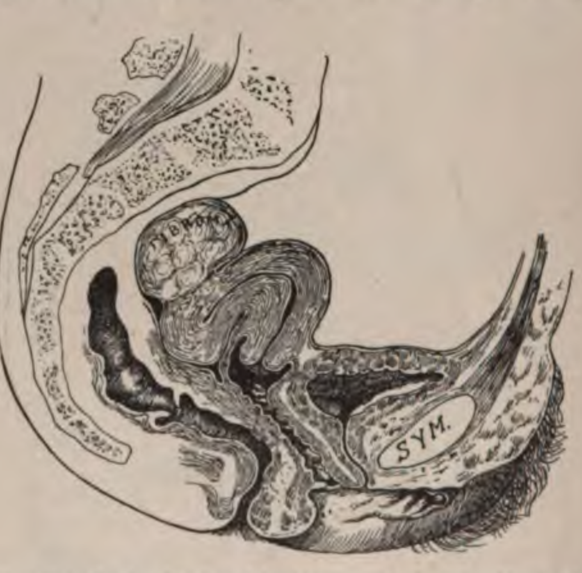

Fig. 353.—Retroflexion Produced by Fibroma of Anterior Uterine Wall.

430. Symptoms.—Retroflexion, like the other forms of displacement, when uncomplicated presents no special symptoms. It produces a sensation of weight and pressure, not infrequently pain in the region of the anus, an uncomfortable sensation down the posterior surface of the lower extremities, points of anesthesia over the thighs, congestion, partial obstruction of the rectum, obstinate constipation, and not infrequently a sensation that the intestine is so obstructed that the bowel can not be evacuated. Development of hemorrhoids, anal fissures, and more or less prolapse of the rectal mucous membrane not unusually follow. Menstruation is irregular and profuse, the menstrual intervals are shortened, and leukorrhea is quite profuse.

431. **Diagnosis.**—Digital examination discloses the cervix situated at a lower level in the pelvis, occupying the axis of the vagina or directed a little anteriorly ; the finger in the posterior fornix recognizes a body slightly above, or even below, the cervix, which is rounded, and somewhat larger than the normal fundus, which may be movable or fixed. Between it and the cervix is a distinct angle, though the structures can be traced from one to the other. The finger in the anterior vaginal fornix and the other hand over the abdomen, discloses the absence of the fundus uteri. Flexion is apparently increased by pressure upon the cervix, and the fundus is driven more deeply into the culdesac. With the finger on either side of the uterus and cervix the lateral margins can be determined. Digital examination by the rectum enables us to pass directly over the fundus and to feel to some degree its anterior surface, which now becomes posterior. Retro-

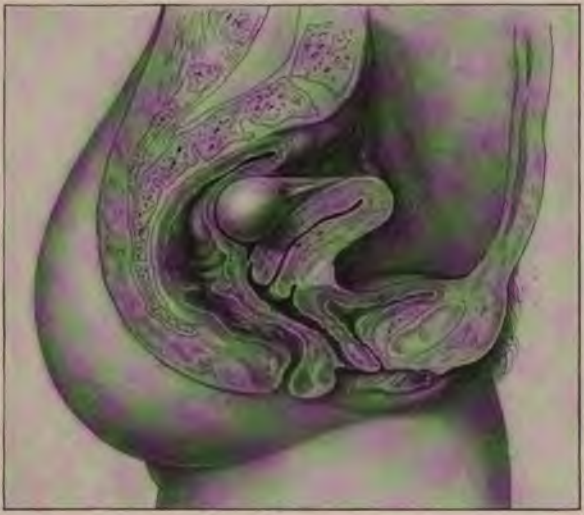

Fig. 354.—Retroflexion Simulated by Posterior Uterine Myoma.

flexion of the uterus can be confounded with fibroid growths situated in the posterior uterine wall, adherent ovarian growths, and pelvic inflammatory exudation. The introduction of the sound into the uterine canal, and its passage backward into the mass, would be definite evidence that a retroflexion exists; but, as in other uterine conditions, this procedure is fraught with so much danger that it is preferable to make the diagnosis without it, and, if necessary, even to leave it uncertain. With a careful bimanual examination, as has been advised, by the rectum, the vagina, or both, we are generally able to determine the relations of the uterus to the surrounding parts, and absolutely to fix the

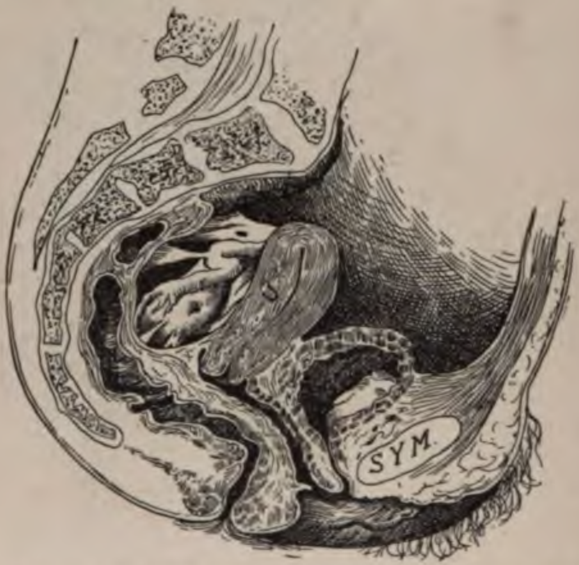

Fig. 355.—Retroflexion Simulated by Small Ovarian Cyst in Posterior Culdesac.

diagnosis. When the existence of pelvic exudate or immobility of the uterus and resistant or thick abdomen prevent its accomplishment, the patient should be given an anesthetic.

432. **Lateral Flexion.**—Lateral uterine bending may be dextroflexion or sinistroflexion. The position of the cervix is more or less fixed and the fundus of the uterus is drawn to one side by cicatricial contraction, or is pushed to the opposite by a large exudate, an intraligamentary fibroid growth, or an ovarian cyst. No special symptoms characterize the state; the diagnosis is readily determined by the methods already cited for the determination of forms of displacement.

433. **Prognosis.**—The prognosis of the displacement will depend upon its degree and the existence of complications. In the earlier displacements, when the distress arises from increased weight of the organ, the mere correction of the position and the maintenance of the organ corrected will bring about a decrease in the size and afford relief from the displacement. After the displacement has existed for some time, it is complicated by chronic inflammatory changes, which will absolutely prevent any procedure from maintaining the organ in its proper position. The symptomatic phenomena, however, can be relieved and the patient practically restored to health.

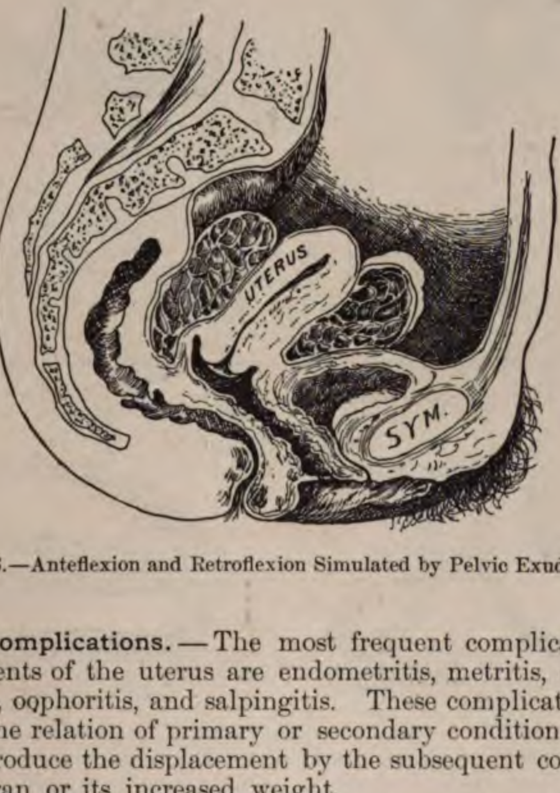

Fig. 356.—Anteflexion and Retroflexion Simulated by Pelvic Exudation.

434. **Complications.** — The most frequent complications of displacements of the uterus are endometritis, metritis, cellulitis, peritonitis, oophoritis, and salpingitis. These complications may stand in the relation of primary or secondary conditions. Many of them produce the displacement by the subsequent contraction of the organ or its increased weight.

435. **Treatment.** — Very frequently the treatment of a displacement is that of the complications which attend it. In some forms of displacement, such as the variations in position and torsion, this may be the only treatment. In other forms the correction of the position of the uterus, by decreasing the ob-

struction to the circulation, will facilitate the treatment of the complication. The methods of treatment are massage, electricity, mechanical measures for the maintenance of the uterus in its proper position, and operative procedures. When the uterus is held in an abnormal position by peri-inflammation, with an extensive exudate either in the peritoneal cavity or in the cellular tissue, massage proves an effective means for freeing the organ and restoring it to its proper relation. Massage is practised by placing the patient on a couch or bed, with the clothing loosened, introducing two fingers into the vagina, or one finger into the rectum and the other in the vagina, while the other hand is placed over the abdomen, the organ raised up against it, and, with rotatory movements, the uterus is compressed between the two hands. The external hand dips down alongside the uterus, and pushes off, separates, and makes pressure upon the bands of adhesion and masses of exudation. The organ is grasped between the two hands, moved upward and downward, from side to side, and the bands of adhesion are stretched until sufficient irritation is induced to favor its reabsorption. This course of treatment should consist of seances of from five to ten minutes, two or three times a week. During the interval the patient should use hot

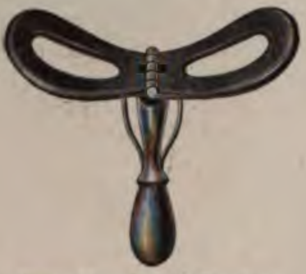
Fig 357.—Zwank Pessary.

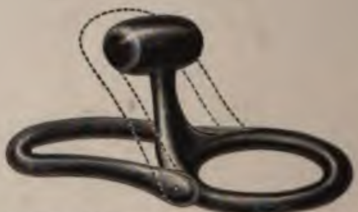
Fig. 358.—Thomas Anteflexion Pessary.

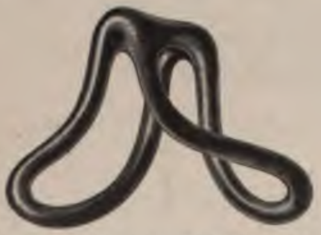
Fig. 359.—Hewitt Cradle Pessary.

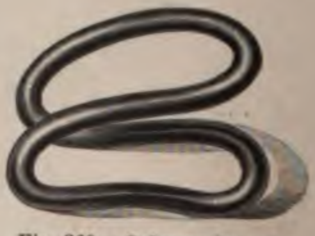
Fig. 360.—Gehrung Pessary.

vaginal douches, rectal enemata, hot sitz-baths, or the application of heat over the abdomen or pelvis in the form of a hot sand- or peat-bath. The treatment may also be supplemented by the introduction of tampons medicated with glycerin, ichthyol and glycerin, or ichthyol ointment (10 to 25 per cent.). The tampon raises up the uterus and places it at a higher level, improves the circulation, and promotes the absorption. Massage has also an influence in stimulating the muscular activity of the ligaments, and promotes the effectiveness of these ligaments in maintaining the organ in its proper place. Electricity may be applied in the form of galvanism or faradism. The former promotes the absorption of exudation ; the latter develops the contractility of the

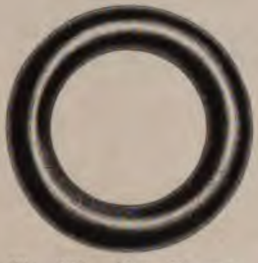

Fig. 361.—Ring Pessary.

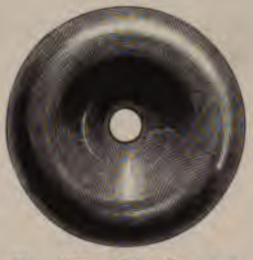

Fig. 362.—Disc Pessary.

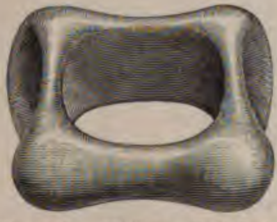

Fig. 363.—Hoffman Soft Rubber Pessary.

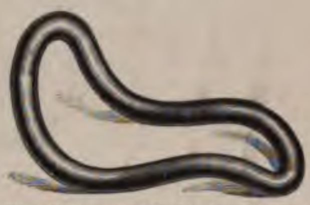

Fig. 364.—Smith-Hodge Pessary.

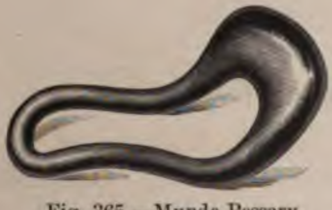

Fig. 365.—Munde Pessary.

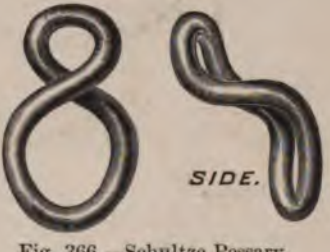

Fig. 366.—Schultze Pessary.

muscular structure. Mechanical measures for retaining the uterus in position consist of tampons and pessaries. The tampons act by distending and stretching the vagina, and afford a cushion by which the uterus is raised and held up. Pessaries are more effective, for the reason that they can be retained in place for a long time, are less likely to be displaced, and exert a more continuous influence. There is a great variety of pessaries; as, pessaries with hinges, pessaries with joints, such as those of Zwank, the Thomas anteflexion pessary, and others, all of which are objectionable on account of the difficulty of keeping them clean and the danger of injuring the surface of the vagina and cervix. The ring, ball, and disc pessaries act by so distending the upper part of the vagina that the uterus or the structures above can not be driven through the outlet. These have little influence, more than to raise up the organ; they exert no influence in maintaining the uterus whose axis has been changed. When the vagina must be so distended by the instrument that a prolapsus can not be reproduced, its long retention produces a certain amount of irritation of the vagina beneath it, which causes the latter to contract, and thus prevents the renewal of the dis-

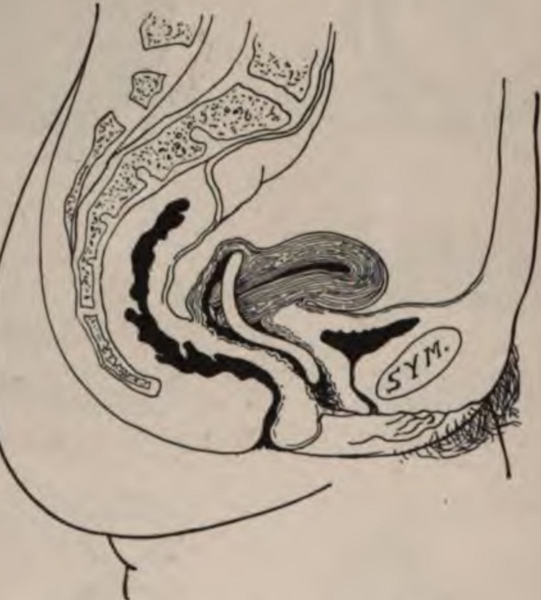

Fig. 367.—Proper Position of the Pessary.

placement. Other special pessaries are those of Hodge, Smith-Hodge, Thomas, Munde, and Schultze, besides a great variety of other instruments, but these are the most important. A pessary is necessarily limited in its application ; the vagina must be in a condition which will permit of the retention of an instrument of sufficient size and shape to maintain the displaced organs in their proper position. The patient who wears a pessary must be kept under supervision to prevent injury. The pessary should be adapted to the individual, and not the individual to the pessary. In other words, the canal should be carefully measured before the pessary is placed, and the woman should not be permitted to pass from observation until it has been demonstrated that the pessary will cause no injury. The pessary is a foreign body. It is a source of irritation in the genital canal. It is, consequently, important that the patient should be given hygienic instruction as to keeping the vaginal canal clean by daily irrigation. During the wearing of the pessary the use of mineral astringents for vaginal douches should be prohibited, as the salts are likely to be deposited on the surface of the pessary, and to cause roughening of the instrument, which produces irritation, ulceration, the form-

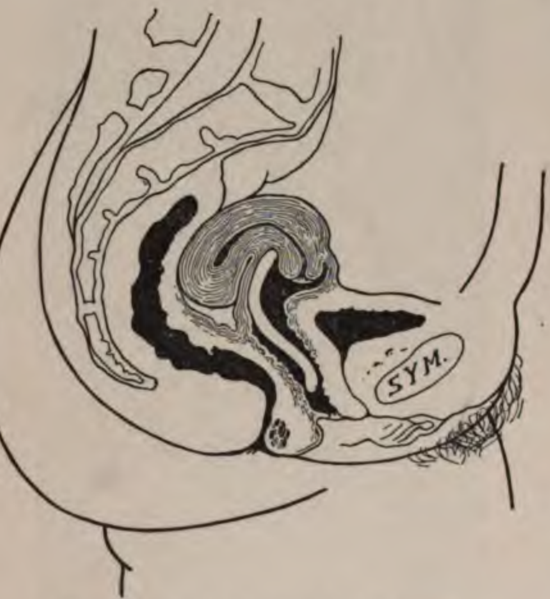

Fig. 368.—Faulty Position of the Pessary.

ation of granulations, and, not infrequently, the more or less complete embedding of the instrument in the vaginal wall. When the instrument is unsuited, too large, or makes undue pressure, it produces ulceration, and may open into the rectum or the bladder. When it is too small, it serves no useful purpose, and aggravates the distress. In the great majority of displacements care must be exercised to first secure a proper position of the uterus before the introduction of the instrument. The commonly mistaken view that the pessary corrects the displacement can not be too strongly combated. It only exercises an influence in maintaining the organ in place, but does not correct the malposition.

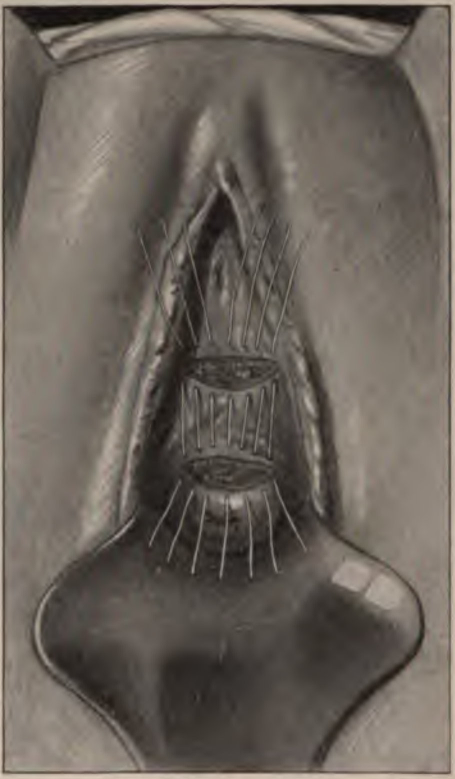

Fig. 369.—Sims' Operation for Anteversion.

Anteversion.—In addition to the general treatment of displacements which we have already discussed, which is applicable to this as to the other forms of deviation, various instruments have been devised to hold up the anteverted uterus. These instruments, however, must act through the bladder, and, consequently, produce more or less distress, and are of little service. Those measures which promote the reduction in size of the uterus are of advantage. When the uterus is the site of chronic metritis, particularly of endometritis, the dilatation, curetment, and introduction of a gauze tent into its cavity facilitates its decrease. The practice of massage, by which bands of adhesion fixing the organ forward, or contraction of the uterosacral ligaments, are stretched and loosened, permits it to resume its normal situation. When the uterosacral ligaments are not shortened, and the cause of the displacement, Sims' operation may be practised. This consists in denuding a surface upon the anterior lip, and another on the vaginal wall at a suitable distance from it, and uniting these two surfaces by sutures. As a result the cervix is drawn toward the vulvar outlet, the fundus tilts upward, and a more correct position is favored. Sometimes the application of a cincture or belt over the abdomen, which will lessen the intra-abdominal pressure, will relieve the great discomfort or ache in the region of the symphysis.

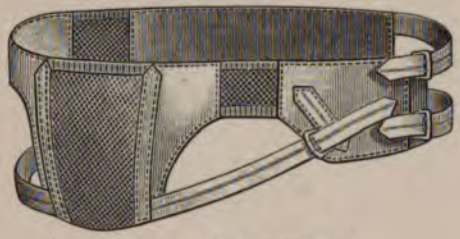

Fig. 370.—Abdominal Belt.

Anteflexion.—Anteflexion should not require treatment unless it causes symptoms. If not improved by douches, tampons, or constitutional measures, the uterus may be dilated by the introduction of a laminaria tent, which, prior to its introduction, has been sterilized by heat and placed for several minutes in a saturated solution of iodoform in ether. As a preliminary to its introduction, the vagina should be carefully cleansed and the cervix sponged with a formalin solution. The cervix is seized with a double tenaculum and straightened prior to the introduction of the tent. As large a tent as the caliber of the canal will permit should be employed. The tent is removed in from twelve to fourteen hours, the uterine cavity irrigated, and, if necessary, cureted and packed with iodoform gauze. The dilatation with tents may be repeated at intervals until the tendency to displacement appears to be overcome, and until any complicating inflammatory condition of the uterus has subsided. Any indication of cellular inflammation about the uterus should be overcome by massage prior to the employment of tents. The uterus can also be dilated by graduated bougies, as suggested by Hegar, and this may be followed by curetment and the use of the gauze drain. It was formerly the custom in an anteflexion to employ a stem-pessary. This stem was $\frac{1}{8}$ of an inch shorter than the uterine cavity. The patient was to wear it for a considerable time. The objection to the stem-pessary is that it is a source of irritation, affording constant danger of infection to the uterine mucosa and leading to the development of more serious trouble. Vaginal pessaries exert but little influence for good. Bilateral incisions and an incision through the posterior lip have been instituted. Unless precautions are taken to prevent the union, the parts reunite; when such precautions are taken, cicatricial tissue is formed, which subsequently causes distress, sometimes greater even than the preexisting condition. The posterior lip can be split up to the angle of the flexion and its cervical and the vaginal lining membrane united by sutures to prevent contraction. Not infrequently, after such an operation, the cervix spreads out, owing to pressure, and the more delicate cervical mucous membrane is thus exposed to pressure and irritation, causing the formation of cysts of Naboth, and irritation of the cervix, which will require continuous treatment. It has been advised to dissect off the anterior wall of the bladder to the level of or above the point of flexion, when, with a grooved director in the uterus, a knife incises the cervix, and as the incision approaches the os, it is carried around the side of the cervix; the cervical mucous membrane is united to that of the vaginal wall. This enlarges the opening from in front, and prevents obstruction, but is subject to the same objection given

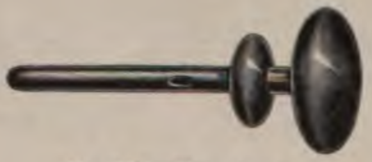

Fig. 371.—Stem-pessary.

to that of the posterior operation, in that it exposes delicate surfaces to irritation and to subsequent inflammation. E. C. Dudley has devised an ingenious operation, which consists in splitting the posterior lip beyond the uterovaginal attachment. The surfaces are held apart by tenacula and the incision is deepened upon the cervical side with a knife. The surfaces are then folded in and secured with silkworm-gut sutures, which unite the uterine and vaginal mucous membrane. These sutures are so introduced that the edge or apex of the incision on each side is carried down in apposition with the base of the incision, so that eversion of the cervical mucous membrane is prevented. The anterior lip of the cervix is then amputated and the wound is closed with transverse sutures which push back the cervical orifice and straighten the canal. Nourse, recognizing that the flexion corresponded to the

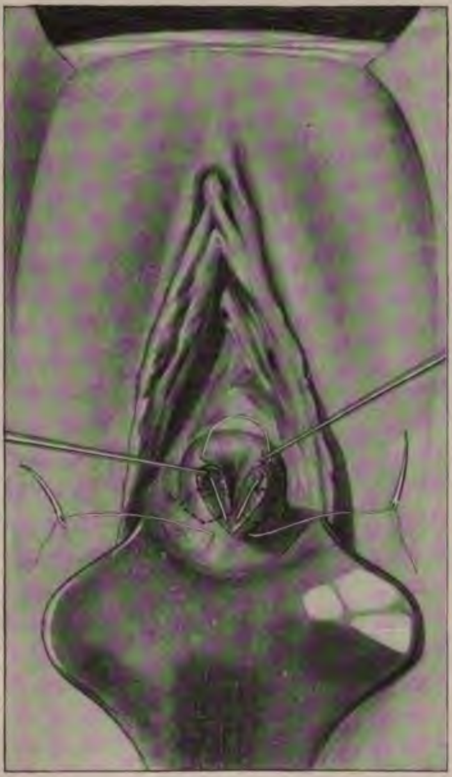

Fig. 372.—Dudley's Operation for Anteflexion, by Incising and Suturing the Posterior Lip.

shorter wall, made a bilateral incision to the level of, or a little above, the angle of flexion, when traction upon the posterior wall straightened the canal, after which the surfaces were united, leaving the posterior lip longer. If the latter was half an inch or over in length, it was amputated by flap procedures to make it the same length as the anterior lip, and the raw surfaces were united by suture. When the elongation is short, it is left to contract.

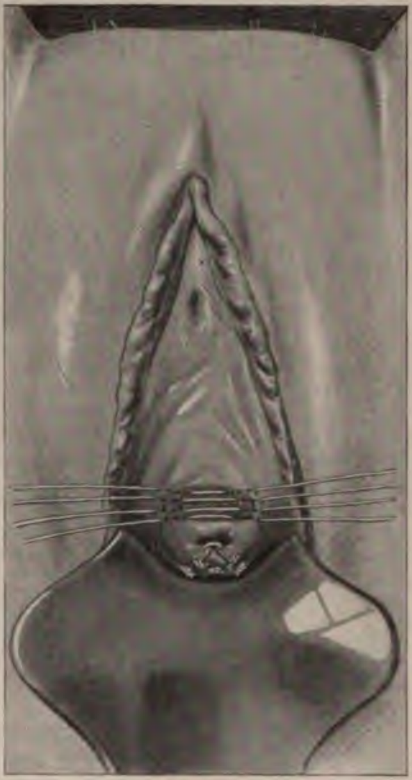

Fig. 373.—Completion of Dudley's Operation, by Transverse Denudation and Suturing of the Anterior Lip.

Retroversion and Retroflexion.—As retroflexion is simply a bending of a version, we will consider the treatment of these two conditions together. While it is true that these displacements may cause no symptoms unless complications exist, yet the position, by its interference with the circulation, renders treatment of the complication inefficient as long as the displacement is present. The relief of the inflammatory condition is expedited by maintaining the uterus in the corrected position. Treatment will largely depend upon the duration of the displacement, the changes which the structures have undergone, and our ability to replace and maintain the organ in position. No means for maintenance of the uterus in position are effective until the organ has first been replaced, and it can then be supported, with relief of many of the distressing symptoms. Three methods are generally recognized as proper for replacing the organ. These are: First, with the patient in the dorsal position, the limbs flexed, two fingers are introduced into the vagina while the other hand is placed over the abdomen. The middle finger, the longer, is passed into the posterior fornix of the vagina, to press up the fundus, while the index-finger is placed in front of the cervix and carries it backward. The pressure against the lower end of the lever carries the opposite end, the fundus, forward until it can be grasped by the external hand and brought into a position of anteversion. Occasionally, the fundus of the uterus will be caught beneath the promontory of the sacrum, and can not readily be dislodged. In such cases, if the cervix is grasped by a tenaculum or vulsellum, and drawn upon while the fundus is pushed

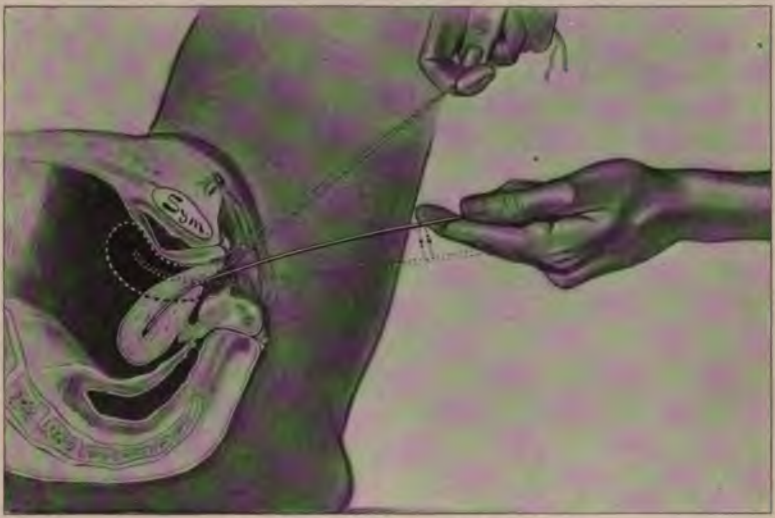

Fig. 374.—Nourse's Operation by Splitting the Cervix and Resuturing the Incisions.

up with the finger in the vagina or rectum, we are able to pass the fundus uteri beneath the promontory, and the cervix can then be carried backward. The second method of procedure is to place the patient in the genupectoral position and introduce a speculum; by atmospheric pressure the vagina is ballooned and the uterus pushed to the upper part of the canal. This procedure does not, of itself, correct the position, as the uterus, while raised, may still be retroflexed or retroverted. If the cervix is seized with a tenaculum or vulsellum, and drawn downward or carried backward, the fundus is dislodged and the position corrected. A third procedure is the employment of the uterine sound: the patient in the dorsal position, two fingers are introduced into the vagina, and the sound, carried between them, enters the os, is introduced through the canal to the fundus, and then rotated. The external end of the sound is carried through a wide arc, so as not to injure the internal mucous membrane, and the handle of the sound is depressed, while the finger in the posterior fornix presses the fundus upward, by which combined movement the fundus is carried forward until it can be controlled with the external hand. The most careful precautions will not prevent this method of procedure from producing irritation of the uterine mucous membrane. It is exceedingly difficult to avoid the danger of carrying infectious material into the uterus, which favors the development of further complications. For such reasons this procedure should not be practised, epecially as every purpose can be readily

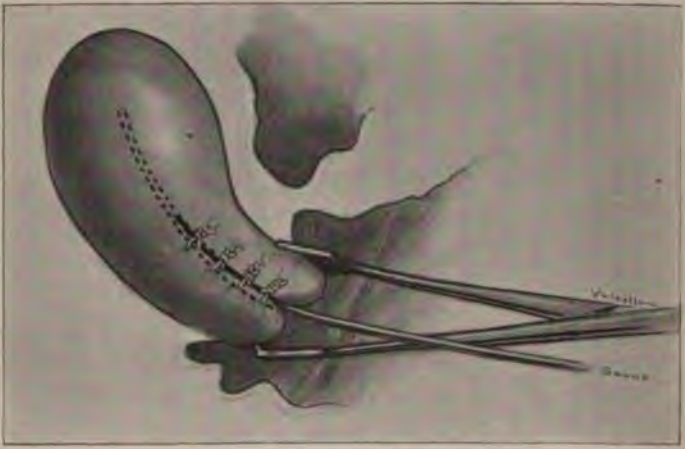

Fig. 375.—Operation Completed.

accomplished through the dorsal manipulation and in the genupectoral position.

In uteri that are adherent none of these methods of procedure will be sufficient to accomplish the restoration of the position. If adhesions exist between the posterior uterine surface and the anterior rectal wall, the intestine may be drawn up sufficiently to permit the uterus to assume its normal position; but as soon as the supporting pressure is removed, the organ drops back, and if mechanical efforts are made to maintain the uterus in position, the fundus is bent backward and the retroflexion is greatly increased. In recent inflammatory troubles, when bands of adhesion are slight and soft, manipulation may be sufficient to break up the adhesion and to permit the organ to be restored to its normal position. Schultze advocated a procedure which is very effective in recent adhesions. It consists in placing the patient in the dorsal position, with the muscles well relaxed by an anesthetic; two fingers are introduced into the rectum, while the thumb in the vagina, against the cervix, steadies the uterus until the rectal fingers, one on either side of the fundus, can invert and draw down the rectum and separate it from the uterine surface. As the adhesions are separated and the uterus set free, the external hand grasps the fundus and draws it forward, and the re-

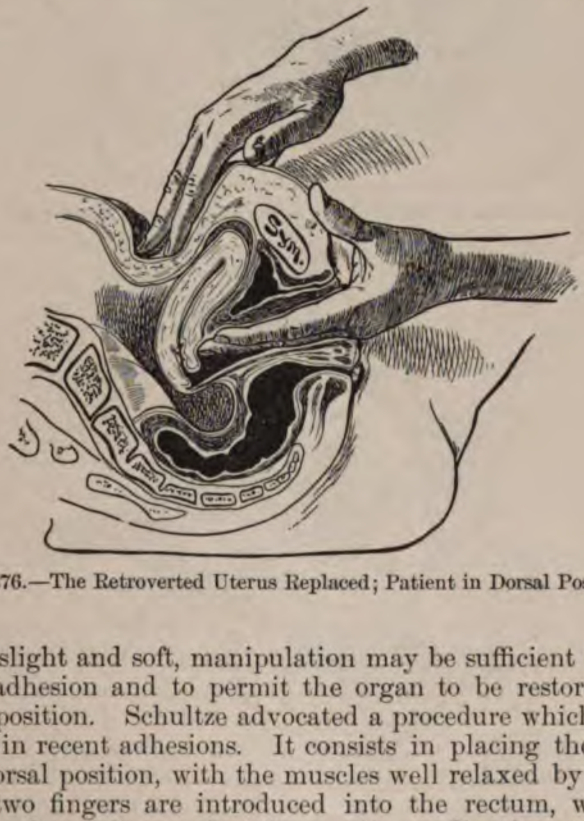

Fig. 376.—The Retroverted Uterus Replaced; Patient in Dorsal Position.

maining bands of adhesion are broken up. In carrying out this procedure care must be exercised not to employ too much force,

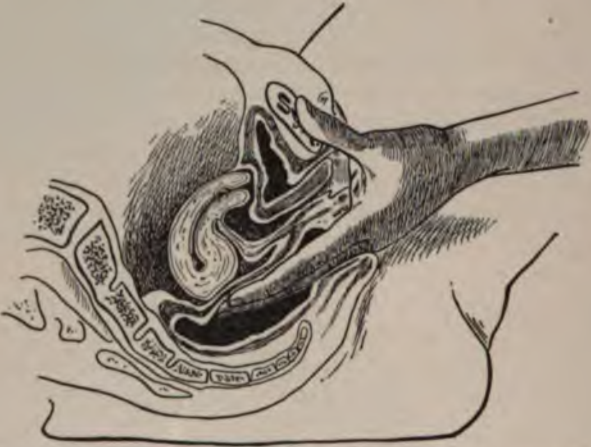

Fig. 377.—Schultze's Method of Replacing an Adherent Retroverted Uterus.

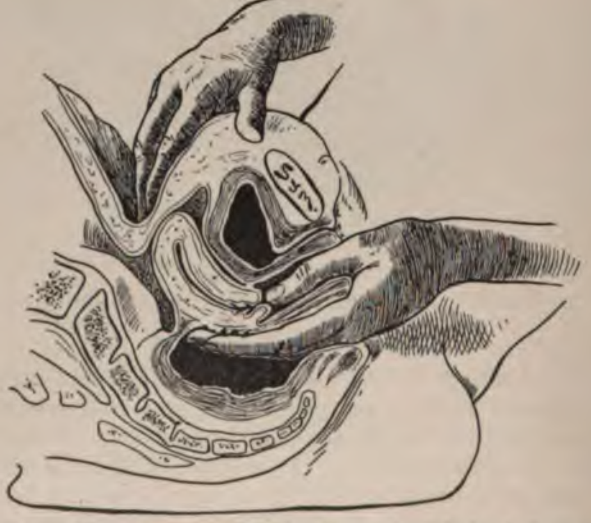

Fig. 378.—Second Step in Replacing Uterus by Schultze's Operation.

as we may very readily injure the intestine; but there is greater danger of injuring a tube or ovary when these organs are adherent. The tube may be torn, and, if the seat of inflammatory trouble, particularly of a purulent character, the result would be a violent attack of pelvic, possibly of general, peritonitis. When we are able to exclude the probability of purulent inflammation or of collections in the tube, the absorption and loosening of the adhesions of the ovary, tube, and uterus can be accomplished by pelvic massage. When the adhesions are extensive and the vagina is tender, especially when its posterior fornix is more or less obliterated by the long duration of the displacement, the uterus can be temporarily supported by the employment of vaginal tampons, medicated or not, as the conditions require.

When the uterus is nonadherent, permitting it to be replaced, we can at once resort to the use of a pessary. The pessaries for retrodisplacement are the Hodge, Smith-Hodge, Thomas, Munde, and Schultze instruments. The various modifications of the Hodge pessary consist of a posterior bar with converging side bars toward their union in the shorter bar anteriorly. Laterally the pessary is shaped like a letter S. The posterior bar is carried behind the fundus of the organ into the posterior fornix. The modifications of Thomas and Munde thicken this bar, and make a larger mass in the fornix. The pessary does not act by supporting the body of the uterus upon its posterior bar, but it so drags upon the posterior vaginal fornix as to pull upon the cervix, lifting it upward until the other end of the lever, the fundus, is thrown so far forward that the intra-abdominal pressure is directed upon the posterior uterine surface. Figure 367 shows the proper position of the uterus as supported by the pessary. Figure 368 shows a uterus whose position is attempted to be corrected by the introduction of the pessary, or where the pessary does not fit well. It is very important that the pessary should not be unduly long. When too much pressure is produced, ulceration of the vagina occurs, rendering the patient unable to retain it; or, if too long, it may project from the vulva, and cause irritation about the urethra or the neck of the bladder and discomfort in sitting. The proper length of the pessary is

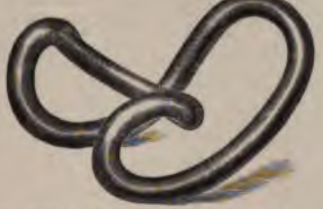
Fig. 379.—Schultze's Sledge Pessary.

determined by the introduction of two fingers into the vagina to measure the distance between the distended posterior fornix of the vagina and the internal margin of the symphysis. The proper width of the pessary is ascertained by determining the extent to which the fingers can be separated without undue lateral pressure in the vagina. We thus arrive at a conclusive idea of the proper size of the instrument to be employed. While a pessary too long produces the conditions we have already mentioned, one too short permits the fundus of the uterus to fall backward over the posterior bar of the instrument, causing increased retroflexion, and adds to the discomfort of the patient. The vaginal canal must not be unduly relaxed, in order to maintain the pessary in place. If the uterosacral ligaments are much elongated and the posterior fornix is distensible, the pessary will not maintain the uterus in normal position, but will permit the organ to drop back and rest upon the instrument. The pessary devised by Schultze, which consists of the figure-of-8, is very effective for such cases. This pessary laterally is similar in shape to that of the Hodge instrument, forming a letter S. The lateral bars of the Hodge pessary are in this instrument twisted to form

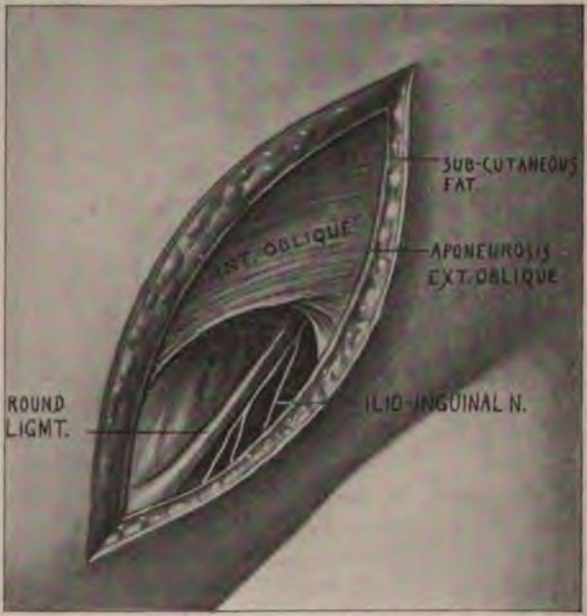

Fig. 380.—Alexander Operation ; Round Ligament Exposed.

a figure-of-8, the upper loop of which surrounds the neck of the cervix and carries it upward, while the inferior loop is so broadened that it receives support from the vagina, and does not tend to prolapse. When the figure-of-8 is unsatisfactory, the sledge pessary of Schultze may prove efficient. Its inferior end has a bar, curved forward, which rests in front against the cervix, and holds it back, at the same time that traction is made upon the cervix through the distention of the posterior fornix by the upper bar of the pessary. The pessary is sufficiently broadened to impinge against the side walls of the vagina to prevent its being displaced downward. It distends the vagina in three directions—in length, laterally, and in the anteroposterior direction. When adhesions are present, the pessary is not well borne,

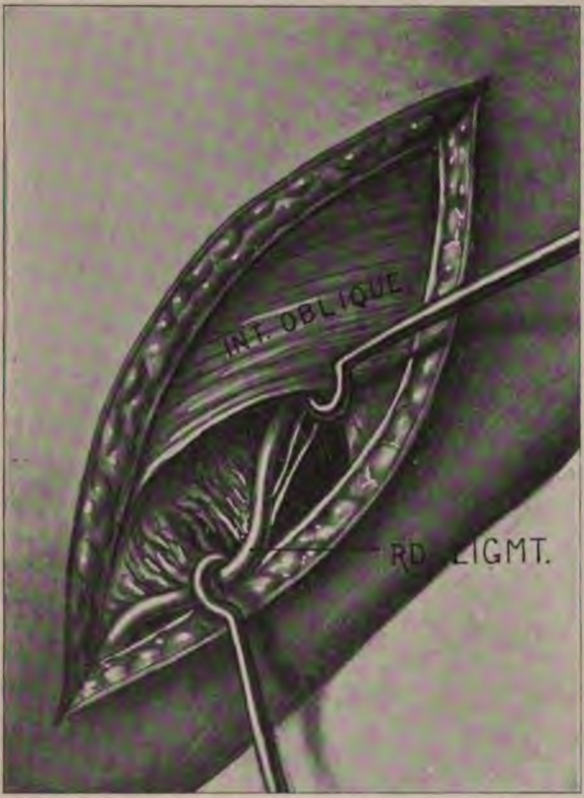

Fig. 381.—Round Ligament Being Drawn Out.

and is harmful. It is a foreign body, produces a certain amount of irritation in the vagina, to many patients is a source of much discomfort, and is not always efficient in the maintenance of the uterus. It must be worn for months or even years to secure sufficient contraction to maintain the organ. Consequently, many patients prefer to submit to operative interference.

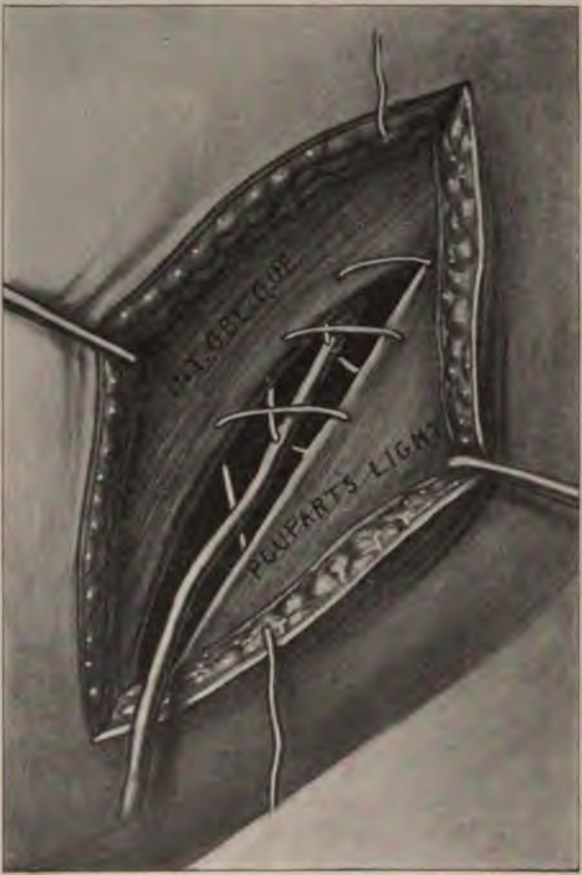

Fig. 382.—Round Ligament Sutured.

The operations for the correction of a retrodisplacement consist in manipulation of the natural ligaments of the uterus, such as the shortening of the round ligaments, which may be extraperitoneal or intraperitoneal, ventrofixation or suspension of the uterus, and vaginal operations for fixation. Shortening the round ligaments is an operation which was devised by Alexander, and hence is known by his name. At about the same period this procedure was also suggested and practised by a Frenchman named Alquie, and by Adams, of England. The operation requires two incisions, and each consists of four stages: First, an incision six centimeters long, a little inside the pubic spine, above and parallel to Poupart's ligament, in which a section of all the tissue to the aponeurosis of the external oblique is made.

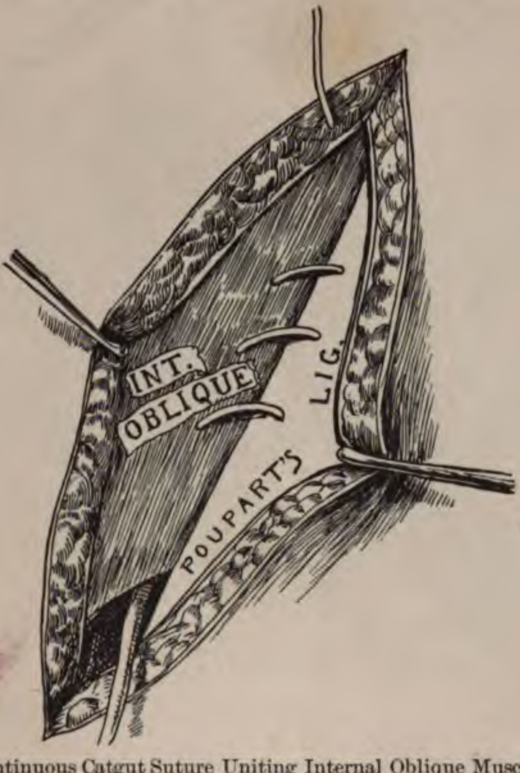

Fig. 383.—Continuous Catgut Suture Uniting Internal Oblique Muscle to Poupart's Ligament.

Second, a search for the round ligament. The latter is disclosed by a small fatty ball which covers the end of the ligament between the pillars. Pressure upon the side causes this to protrude. Passing a hook beneath this mass, the ligament is raised, and can be detached from the adherent fibers which maintain its relation to the inferior part of the canal with a director or bistoury. It is then seized with a pair of forceps and drawn out. After having completed the first and second stages, upon both sides, we proceed to the third, which consists of shortening and fixation of the ligaments. The ligaments are drawn upon until the fundus is brought under the pubes. This movement can be facilitated and rupture of the fibrous filaments avoided by previously placing the uterus in anteflexion by the sound or through the employment of the fingers of an assistant. The ligaments are drawn out from four to ten centimeters, according to the resistance. When they become tense, they are maintained by an assistant, while a needle charged with silk, silkworm-gut, or catgut is made to traverse the external pillar, the ligament, and, next, the internal pillar. Three sutures are thus introduced a centimeter apart. Fourth, the wound is closed with silk or silkworm-gut sutures and is dressed with gauze, and the parts are so

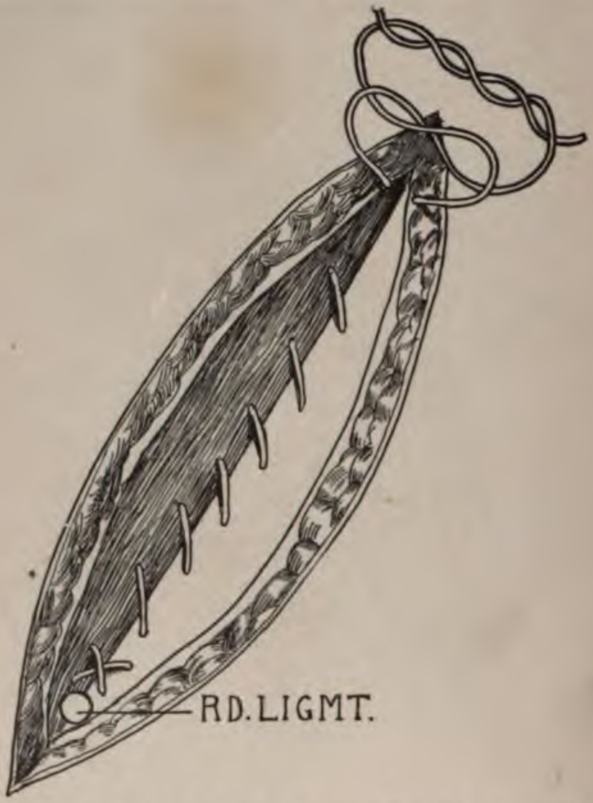

Fig. 384.—Return Layer of Suture Bringing External Oblique Muscle in Apposition.

secured by bandaging as to prevent the wound from becoming exposed by the movements of the patient. The employment of a Hodge pessary for about two months following the operation is advisable, although some prefer the tampon. The operation has been variously modified. Edebohls splits up the entire length of the inguinal canal, draws the ligament out at the internal ring, and closes the wound as in Bassini's operation. Newman makes his incision directly over the internal ring and draws the ligament straight out, after which it is fastened in the wound. Franklin Martin, and Duret, of Lille, do not use sutures, but pass a pair of dressing forceps beneath the skin and subcutaneous tissue from one wound to the other, draw a ligament through, tie the two ligaments together in a knot, and close the tissues over it. The disadvantages of the Alexander operation are: First, that two incisions have to be made. Second, that the operation is limited in its application. It is only in those cases in which the uterus is mobile that we can practice this procedure, consequently it has a further disadvantage in that we are not always able definitely to determine the existence of adhesions between the uterus and the anterior wall of the rectum. Should such adhesions exist, the uterus, drawn forward by the round ligaments, is subject to forces which tend to render the operation nugatory. Third, the round ligaments are sometimes so attenu-

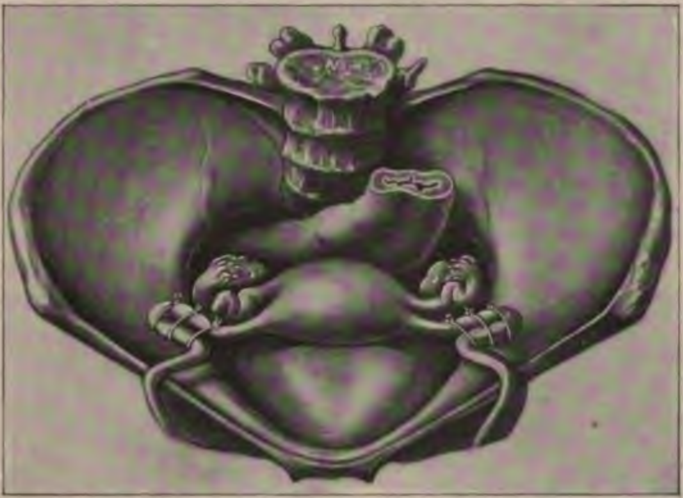

Fig. 385.—Wylie's Operation for Shortening the Round Ligaments within the Abdomen.

slip back, carrying infection in beneath the peritoneum, where it will be difficult to reach, and rendering the operation, as has been proved, not altogether free from danger. The intraperitoneal method of shortening the round ligament consists of an incision in the median line through the abdomen; the uterus is drawn up; the condition of the appendages is examined, and they are treated if necessary; existing adhesions are broken up; and the round ligaments are shortened by folding them. The operation may be performed, as Wiley has suggested, by doubling up from two to four inches of the ligament on each side, and uniting it by sutures, so that the shortening of the ligament draws and holds forward the fundus. Mann grasps the broad ligament about the junction of its middle and outer thirds and folds the ligaments in three parts, which are united by sutures, so that the ligament is well shortened on each side. A. P. Dudley, of New York, performs an operation which he calls desmopycnosis. It is carried out as follows: After opening the abdomen an assistant introduces two fingers into the vagina, pushes the uterus as high as possible in the pelvis, and it is thus brought through the abdominal incision. An oval denudation is made upon the anterior wall, taking care not to go too near the bladder; then each round ligament is brought up to the portion of the peritoneal covering on the inner side, denuded to correspond to that on the uterus, and the three denuded surfaces are united with catgut sutures. In adjusting the sutures care must be taken to pass them sufficiently deep in the uterine tissue to secure against their cutting out before union has occurred. The uterus, when dropped back, is held forward in a position of anteversion.

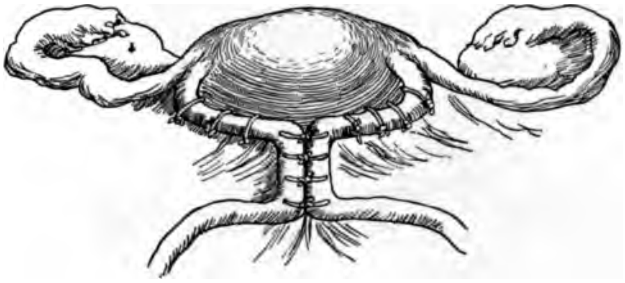

Fig. 388.—Dudley's Operation Completed.

Ventrofixation.—Ventrofixation, an operation devised by Olshausen, and modified by Kelly, for maintaining the uterus forward, consists in an incision in the median line, through which the uterus is exposed, and its fundus sutured to the parietal peritoneum at the lower angle of the wound. Two or three buried sutures, of silk, silkworm-gut, catgut, or silver wire, are employed. The first is passed through the peritoneum about one centimeter from the wound margin, through the fundus uteri near its center, and brought out through the peritoneum of the opposite side of the wound. A second suture is similarly placed, about eight millimeters behind the first. Unless a large band of adhesion is desired, the two sutures are sufficient. To prevent the peritoneum from being dragged away from the abdominal wall it is included in the abdominal suture. The operation permits thorough exploration of the pelvic cavity, the separation of adhesions, and the fixation of the uterus through a single incision. This procedure has been greatly modified; thus, by some the sutures are placed in the anterior uterine wall. The majority of operators introduce the sutures in the fundus—the first suture in the line of the Fallopian tubes, and the second a little behind it, so that the uterus is thrown forward in slight anteflexion. The purpose is to establish a ligamentous union which will permit a certain amount of uterine mobility; consequently, the uterus is attached only to the peritoneum rather than to the muscle-wall. To avoid the buried suture, Martin has suggested using the urachus, and,

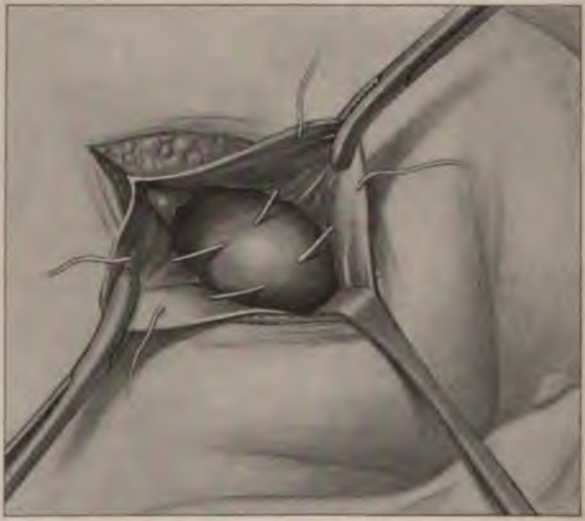

Fig. 389.—Sutures Introduced for Ventrosuspension.

when it is not well defined, a loop of peritoneum which is carried from below upward through a button-hole slit in the fundus, and included in the sutures closing the wound. A transverse incision two inches above the symphysis, through the skin and superficial fascia, with a vertical incision through aponeurosis, muscle-wall, and peritoneum, has been advocated for ventrofixation. The uterus is brought forward and secured by two silkworm-gut sutures through the fundus, which are brought out through the muscle-wall and segment of the integument below the transverse incision. The remaining portion of the vertical wound is closed with catgut, and the transverse incision of the skin with a continuous intercuticular stitch of silk. The suspensory sutures are now tied over a gauze roll and are permitted to remain two weeks.

Ventrofixation has the advantages, already suggested, that it permits the inspection of the condition of the peritoneal cavity, the treatment of diseased appendages, the separation of adhesions, and the fixation forward of the uterus in a position which is unlikely to give distress. It has the disadvantage that it has been found to interfere to some degree in subsequent gestation and labor, the patient complaining of more or less pulling and distress during the progress of gestation, sometimes so marked as to cause abortion or premature labor. When the band of fixation is short, large, and firm, it may prevent enlargement of the uterus and produce thinning of the posterior wall, which will increase the danger of rupture and afford obstacles to the normal progress of parturition. A firm band of adhesion in pregnancy after ventrofixation simulates a bifid uterus. A further disadvantage exists in that the operation is not free from danger. I saw one patient in whom a large portion of the intestine slipped below the band of adhesion, became strangulated, and caused death. Similar cases have been reported by Lindfors, Jacobi, and Olshausen. Ventrofixation has been employed for the treatment of immobile anteflexion by Burrage, who, through the abdominal incision, divides the uterosacral ligaments close to the uterus and fastens the fundus to the abdominal wall. Schmidt, of Cologne, freed the anterior uterine wall from the bladder by dissection, excised a wedge-shaped piece with its point directed toward the cervical canal, and united the surfaces by sutures, which drew the uterus forward to produce an anteflexion.

Vaginal Operations.—The operative procedures suggested for the treatment of retrodisplacements by the vaginal route are the following: Schuecking's operation, in which the uterus is anteflexed, and an instrument curved for an acute anteflexion passed to the fundus, from which a concealed needle is driven through the anterior vaginal fornix. This needle carries back a ligature, which, when tied, fixes the uterus in a position of anteflexion. Care must be exercised in its introduction to push the bladder to one side to avoid its injury. Injury of the intestine has also occurred. The ligature is permitted to remain for two or three weeks, when the resulting inflammatory changes will maintain the uterus in an anteflexed position. The procedure is objectionable in that it is a blind operation, and injury may be unavoidable. Instruments have been devised to push the uterus against the anterior abdominal wall and to thrust needles carrying ligatures from its cavity by which the fundus can be fastened. Vaginal fixation, devised by Duhrssen, subsequently practised and modified by Mackenrodt, consists in a vertical incision through the anterior vaginal wall to the cervix, when the bladder is pushed off until the peritoneum is reached; without opening the latter a suture is introduced, and by it the uterus is pulled forward. A second suture is placed higher, quite near the fundus, the ends being brought through the edges of the vaginal incision. Mackenrodt's modification consisted in opening through the peritoneum and introducing the sutures at a higher level, securing the fundus or anterior wall to the vaginal incision. The peritoneal and vaginal wounds were then closed. Wertheim brought the folds of the round ligament into the wound and sutured them to the edges of the vagina. The round ligaments have also been shortened through the vagina, thus performing Wiley's operation. This procedure has been carried out and advocated by Vineberg and others. I have sutured the round ligaments to the anterior surface of the uterus by the vaginal opening. Freund and Gottschalk operated upon the uterus by shortening its uterosacral ligaments through a vaginal incision. A posterior colpotomy by vertical incision was made; a suture, by means of the ligature carrier, was placed through the middle of the uterosacral ligament; and the other end of this ligature was carried through the posterior surface of the cervix. After a ligature was introduced on each side and tied, the cervix was drawn upward and backward, and the other end of the lever, the fundus, was thrown forward. Pryor operates by a transverse incision through the posterior fornix of the vagina, through which he breaks up adhesions, carries the uterus forward, and packs gauze into the posterior culdesac, and, with a tampon, presses the cervix well upward and backward. The subsequent adhesion of the cervix in this position leads to correction of the malposition. As metritis and endometritis are complications of all these forms of displacements, operative procedure should be preceded, at the same operation, by the dilatation and curetment of the uterus.

Prolapsus.—The treatment of prolapsus uteri will depend upon the extent of the displacement, the involvement of the vagina, the distention of the vaginal orifice, and the age and physical condition of the patient. The first step is the replacement of the displacement. This consists in placing the axis of the uterus parallel to that of the vagina and pushing the organ upward, reinverting the vagina until the fundus of the organ reaches its normal position. If the ligaments are not too greatly relaxed, the uterus may be supported by a pessary. Ordinarily, an instrument must be sufficiently large to distend the vagina and to rest upon the perineal muscles. Pessaries for this purpose are the globe, disc, and ring pessaries, the Thomas or Munde retroversion pessary, and the figure-of-8 and sledge pessaries of Schultze. When the vagina is very greatly distended, the retention of a pessary is impossible, as straining or the assumption of the upright position results in downward displacement of the uterus, carrying with it the pessary. In a displacement which has existed for a long period, the uterus having become large and adhesions having formed, reduction may be accomplished with difficulty. Occasionally, pressure by the application of an Esmarch or a rubber bandage, to compress the edematous tissues and reduce the size of the projecting mass, will be required to secure its return through the pelvic canal. Adhesions may render necessary the employment of massage or manipulation to accomplish replacement. The intra-abdominal distention may be so marked, and inflammatory adhesions so extensive that a reduction of the hernia will be impossible. In a recent operation for irreducible prolapsus the protrusion had not been replaced for four years, and the condition was complicated by septic symptoms. Upon incising the sac, both ovaries were found in it, one of which, with the corresponding tube, formed an extensive tubo-ovarian abscess. Ulceration of the vagina and cervix are not infrequent results of interference with the circulation. Unless the points of ulceration are so situated as to interfere with the proper retention of the pessary, they cause no special inconvenience, and soon disappear, when the organ is maintained in its proper position. Various pessaries devised with external support consist of soft or hard rubber cups upon stems which are fastened to a belt around the abdomen. The instruments are uncleanly, cause more or less irritation of the cervix, the vagina, and the vulvar outlet, and are exceedingly disagreeable to wear. The operative treatment of this displacement must comprise: first, the reduction of the size of the uterus; second, the contraction or narrowing of the vaginal canal; third, fixation of the fundus of the organ in anteflexion or anteversion, so that the intra-abdominal pressure will no longer drive it downward. It was formerly the general rule to amputate a portion of the cervix for its influence in decreasing the size and weight of the uterus, but as retention of the uterus in its normal position generally results in a decrease in size, it is not a necessary procedure. Only when the cervix is diseased by extensive laceration and local hypertrophy, with possibly more or less cystic degeneration of its glands, should the operation be regarded as indicated. Contraction of the vagina is secured through anterior and posterior colporrhaphy and perineorrhaphy. The anterior colporrhaphy was suggested by Sims, who made a V-shaped denudation upon the anterior wall and united its raw surfaces by sutures. A sulcus was formed in the anterior wall, in which the cervix occasionally became imprisoned, discharges were retained, and an insufficient support was afforded.

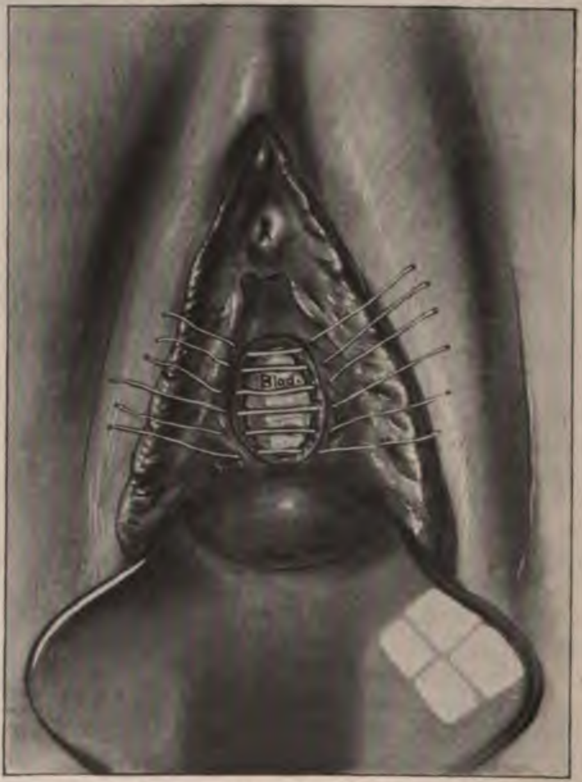

Fig. 390.—Anterior Colporrhaphy. Anterior Vaginal Wall Removed.

A better procedure consists in fixing the anterior vaginal wall at four points, performing a denudation of such a character as will fold in the redundant tissue in every direction. In suturing the denudation, we may employ Stoltz's purse-string suture encircling the denudation, the introduction of sutures transversely, or sutures so introduced as to shorten the wall in the vertical as well as in the transverse direction. The most effective procedure is to cut through the vaginal wall, push off the bladder by blunt dissection until a sufficient amount of tissue is separated, and cut away the superfluous wall. The redundant vesical wall can be folded or retracted by catgut sutures, and the vaginal wall united by sutures over it. This procedure restores the fascia so that the anterior segment of the pelvic floor is subsequently maintained. Denudation upon the posterior wall follows. It may be made in the lateral col-

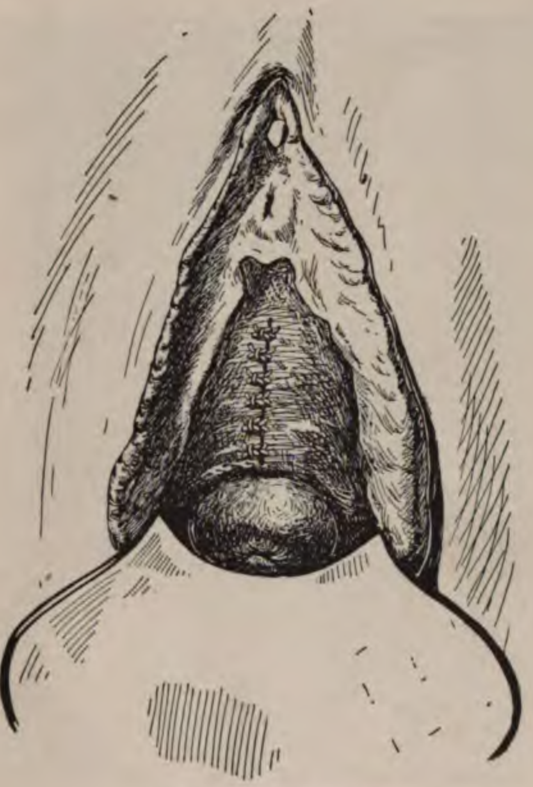

Fig. 391.—Wound Closed.

umns, as suggested by Martin, or, preferably, the Hegar or Simon's denudation, in which the raw surface extends upon the posterior wall from a point immediately beneath the cervix. The denuded surfaces are united by sutures and the perineum is restored. In uniting the surfaces the torn edges of the levator ani and bulbocavernosi muscles are well apposed, the levator ani being especially drawn in front of the rectum. When the pelvic floor is very much relaxed, the operation devised by Dudley will serve a useful purpose. It consists of a denudation in each lateral fornix of the vagina, which is extended on each lateral surface of the canal. When the uterus has undergone hypertrophic elongation, with complete vaginal inversion, no vaginoplastic operation will be efficient. Sooner or later the weight of the uterus, combined with the intra-abdominal pressure, will drive through

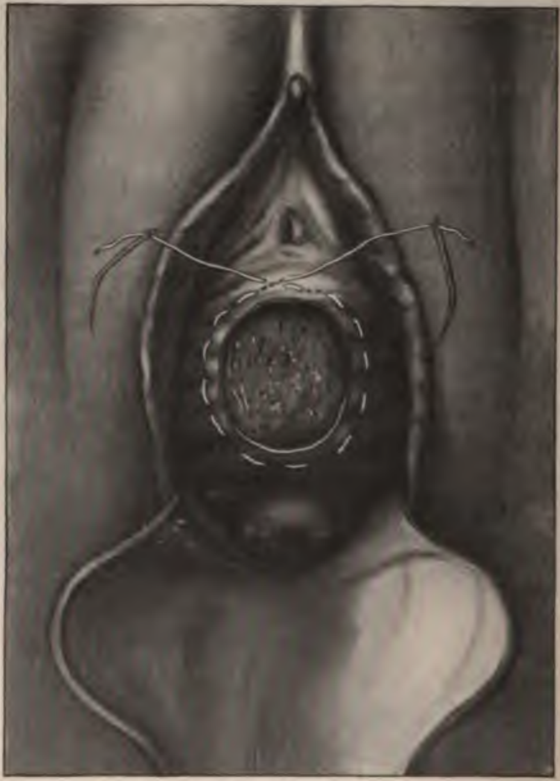
Fig. 392.—Stoltz's Purse-string Suture.

this newly united tissue and redevelop the condition. This may be obviated by following Baldy's suggestion, to amputate the body of the uterus at the internal os, cover the stump with peritoneum, and fasten it by ligatures to each broad ligament; or, still more effectively, suture the stump to the abdominal incision, as practised by Noble.

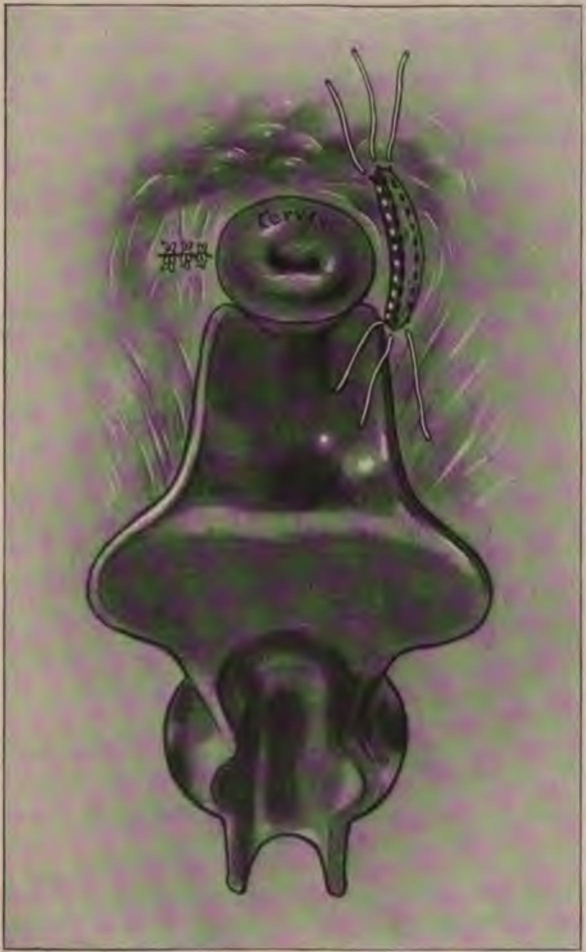

Fig. 393.—First Stage of Dudley's Bilateral Denudation of the Vaginal Walls for Prolapsus.

When ventrofixation is practised, the aim should be to secure a firm band of adhesion, which is best accomplished by turning back the parietal peritoneum, and to bring the fundus in contact with the muscle of the wall. This procedure is open to the objection that the heavy organ hangs from the abdominal wall, and causes distress, with fear of the redevelopment of the hernia. Shortening the uterosacral ligaments from within the abdomen obviates this difficulty, and in much relaxation should supplement the ventrofixation. By this combined procedure the uterus is fixed so that the intra-abdominal pressure is directed upon its posterior surface and all possibility of its being driven down upon the plastic structures of the vagina is obviated. The question may be asked, Why would it not be preferable to extirpate the uterus in extreme prolapsus to doing one of the operations we have suggested? Extirpation of the uterus is ineffective to cure the pelvic hernia unless supplemented by plastic operations on the anterior and posterior walls of the vagina—a procedure which frequently complicates the operation of extirpation, especially in the rare cases in which the prolapsed organ becomes so strangulated that gangrene results. I was obliged to perform an extirpation because of cervical gangrene in one patient. The operation

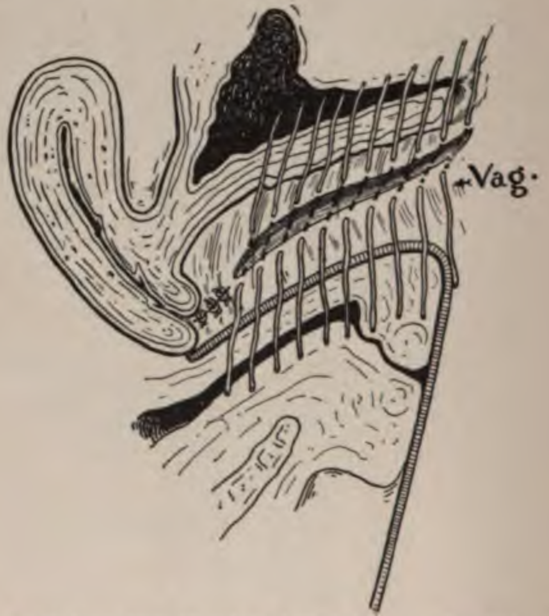

Fig. 394.—Dudley's Operation, Showing Denudation upon One Side of the Vagina.

was supplemented by a plastic procedure upon the vagina, from which the patient thoroughly recovered.

In old and enfeebled patients with extensive prolapse, when the general health forbids resort to a serious operation, Freund has suggested the following procedure: A silver wire suture, about one centimeter from the os, is made to encircle the mass beneath the mucous membrane. The ends of this suture are introduced and brought out at the same opening. The cervix is then pushed up and the ends of the wire are drawn out and twisted to secure it, after which the ends are pushed beneath the mucous membrane, completing the burial of the entire wire. From four to six such sutures are introduced, one above the other, and similarly secured, by which the uterus and vagina are supported. The operation would be unsatisfactory in married women or during the child-bearing period.

436. **Summary.**—In anteversion and anteflexion of moderate degree improvement of the general health, regulation of the secretions, enforced rest during menstruation, dilatation, curetment, and drainage will be means sufficient to establish a symptomatic cure.

When the anteflexion is acute and dysmenorrhea marked, the posterior lip may be split, subsequent to curetment, and Dudley's procedure, as indicated in the text, will be serviceable. Retroversion and retroflexion are capable of producing more marked influence upon the general health, but should not be considered as indications for the practice of special procedures unless productive of symptoms.

The correction and maintenance of the uterus in position is indicated as a preliminary to the treatment of any complication.

A retroversion produced by subinvolution following a recent parturition, when uncomplicated by perimetritic adhesions, should be replaced and maintained by a pessary.

Replacement before the introduction of a pessary must be a *sine qua non.*

In retroflexion or when a pessary is not well borne, the Alexander operation may be employed when the uterus is freely movable. When the retrodisplaced uterus is bound by adhesions which can not be safely broken by Schultze's procedure, the abdomen should be opened through a median incision, the appendages inspected, subjected to necessary treatment, adhesions separated, the uterus secured in anterior position by suturing the fundus to the parietal peritoneum, or, preferably, the intra-uterine shortening of the round ligaments, as practised by Mann.

Vaginal fixation has proved unsatisfactory in that the cases have experienced much more trouble in subsequent pregnancy than has characterized the abdominal procedures.

Prolapsus uteri is a condition that should demand early consideration. The longer the displacement is permitted to go unantagonized, the greater are the chances that it can not be completely overcome.

The first stage of uterovaginal prolapse can be corrected by the employment of a suitable pessary. An instrument should be employed which will maintain the uterus in a position of anteflexion or anteversion. The early stage of vagino-uterine prolapse should be considered as an indication for the prompt retraction of the relaxed vaginal walls and the restoration of the perineum. In later stages vaginal plastic operations should be supplemented by a fixation operation to maintain the organ forward. During the child-bearing period the latter operation may consist of the extraperitoneal or intraperitoneal shortening of the round ligaments, according to the possible need for intraperitoneal inspection and treatment. Subsequent to the climacteric, ventrofixation is preferable. In very extensive prolapsus or in elongation of the supravaginal cervix the fundus uteri should be

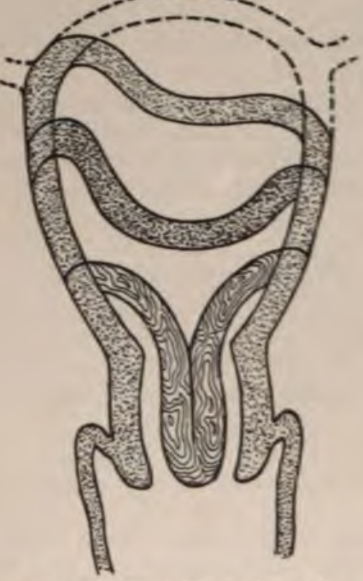

Fig. 395.—Partial Inversion of the Uterus, Showing Three Degrees.

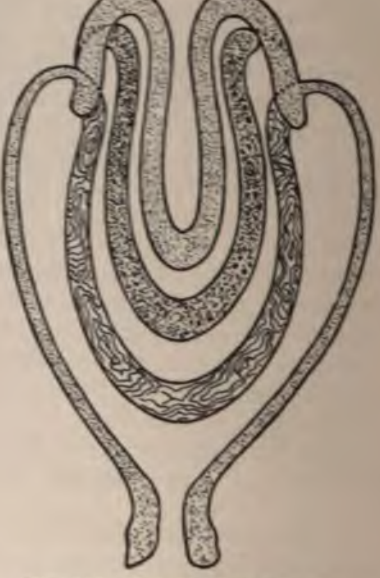

Fig. 396.—Intravaginal Inversion; Three Degrees.

amputated, and afterward the stump should be secured to the upper part of the broad ligament (Baldy) or to the anterior abdominal wall (Noble). Not infrequently the condition will be complicated by an extensive hernia through Douglas' pouch, when the vaginoplastic operations, combined with ventrofixation, will not prevent the redevelopment of the hernia.

The recurrence of hernia may be obviated, however, by suturing together the folds of Douglas in front of the rectum, and the remaining part of each fold to the side of the rectum. Enteroptosis may be still further prevented by fastening the descending colon to the abdominal parietes. In old and enfeebled patients the operation of Freund affords a safe and secure method of supporting the uterus within the pelvis.

437. Inversion of the Uterus.—Inversion of the uterus is that condition in which its inner or mucous surface is outside and its external or peritoneal surface turned in. Inversion can be partial or complete, and presents three different degrees: In a partial inversion the body of the organ is depressed and inverted until it reaches the cervix, but without dilating the latter, when it is known as the first degree, or *inversion intra-uterine.* Next, the fundus protrudes through the cervix, the cervix being turned down upon the neck like a cuff, which is the second degree, or *inversion intravaginal.* In the third degree the entire uterus is inverted, and with it, not infrequently, the vagina, the uterus hanging outside the vulva, and this is known as *inversion extravaginal.* Now, every degree of this form of alteration of the uterus can combine itself with a partial or total inversion of the vagina, so the view that the third degree only is necessarily combined with prolapsus is a mistake. A trifling degree of inversion or partial turning in of the uterus is called *invagination.* This may

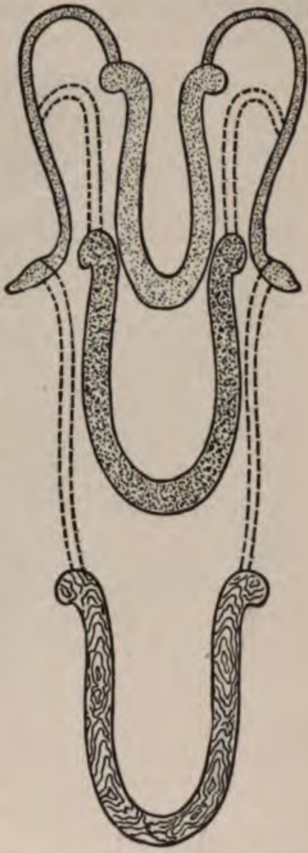
Fig. 397.—Extravaginal Inversion; Three Degrees.

be a mere depression, over which the mucous surface becomes convex, while the peritoneal surface forms a depression or concavity. As this depression continues, the proximity of the tubes and round ligaments to the ligamentum ovarium draws these structures into the opening. The ovaries may rest upon the funnel-shaped depression, while the tube is necessarily, for a part of its extent, drawn into the cavity. The cavity, with its enlarged opening in the peritoneal cavity, is called the inversion funnel. This funnel is usually not quite the depth of the ordinary length of the uterine cavity. If the inversion continues for some time, secondary phenomena result, from retrogressive processes, but the uterus returns to its normal size. The inverted mucous membrane is covered with epithelium; the neck of the uterus is small, generally surrounded by a cuff of tissue, derived from the

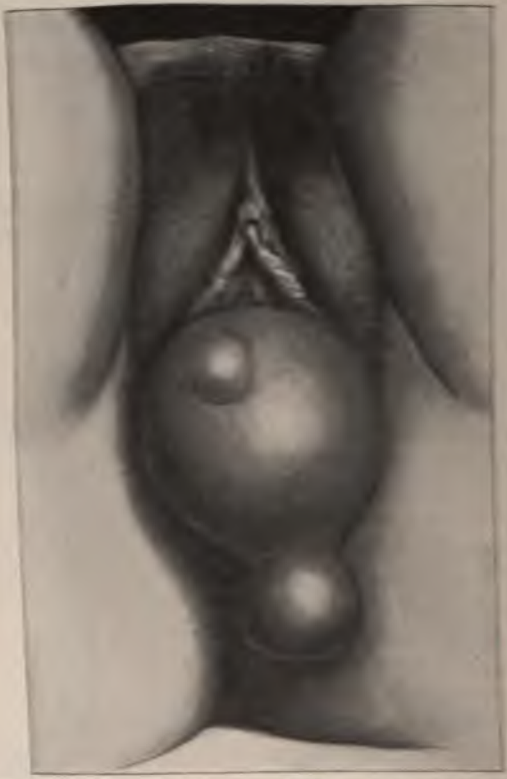

Fig. 308.—Nonpuerperal Inversion. Fibroid Tumor Attached to the Fundus Uteri.

cervix, which has not been completely inverted—a cervical ring. The longer the inversion exists, the more considerable is the congestion, edematous enlargement, and thickening, which form the misproportion between the narrow inversion funnel and the enveloping cuff of the cervix. We not infrequently find diseases of the adnexa. The orifice of the tube situated in the vagina can readily be the avenue for the passage of infection into the deeper structures. The uterine inner surface of the tubal mouths is exposed, the projecting mucous membrane is frequently rubbed and irritated, so this door stands open for the entrance of germs, and infection can take its way through the tubal mucous membrane or by the lymphatics to the deeper tissues, producing endosalpingitis, suppurative processes in the ovary, or purulent pelvioperitonitis by extension of infection from the connective tissue. In ordinary conditions we can have involvement of the cellular tissue from such infectious processes. Alterations in the

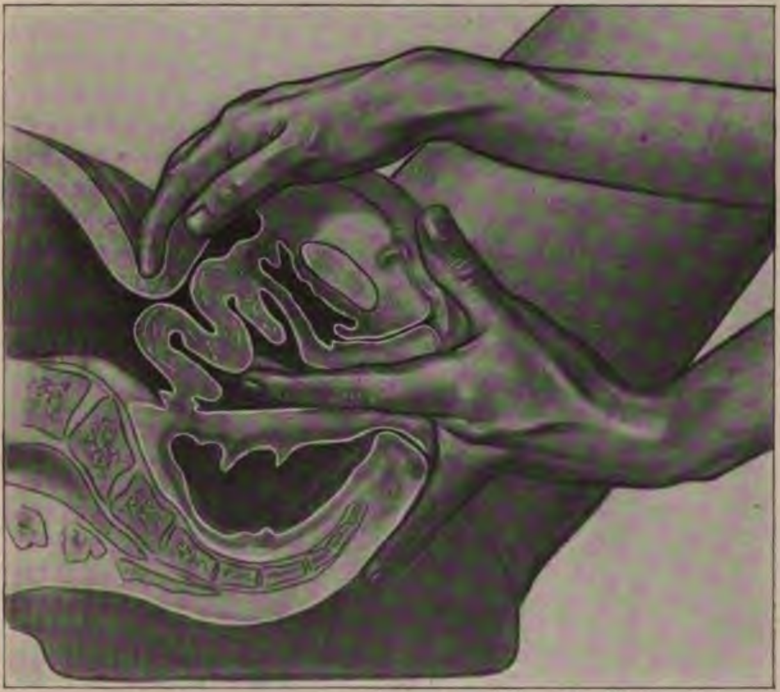

Fig. 399.—Palpation of an Inversion of the First Degree.

peritoneal covering of the inversion funnel occur, which render the condition more or less fixed.

438. Etiology.—The inversion generally arises from two causes: first, from puerperal conditions, relaxation, or partial paralysis of the uterus during the process of labor, especially the third stage of labor; and, second, the nonpuerperal form, in which the uterus is displaced by the presence of a fibroid tumor attached to the fundus. These two conditions are very much alike in the clinical form of an inversion, but are very different in their manner of development. Puerperal inversions are much more frequent than those which arise from the presence of growths. They are in the proportion of nine to one. Total in-

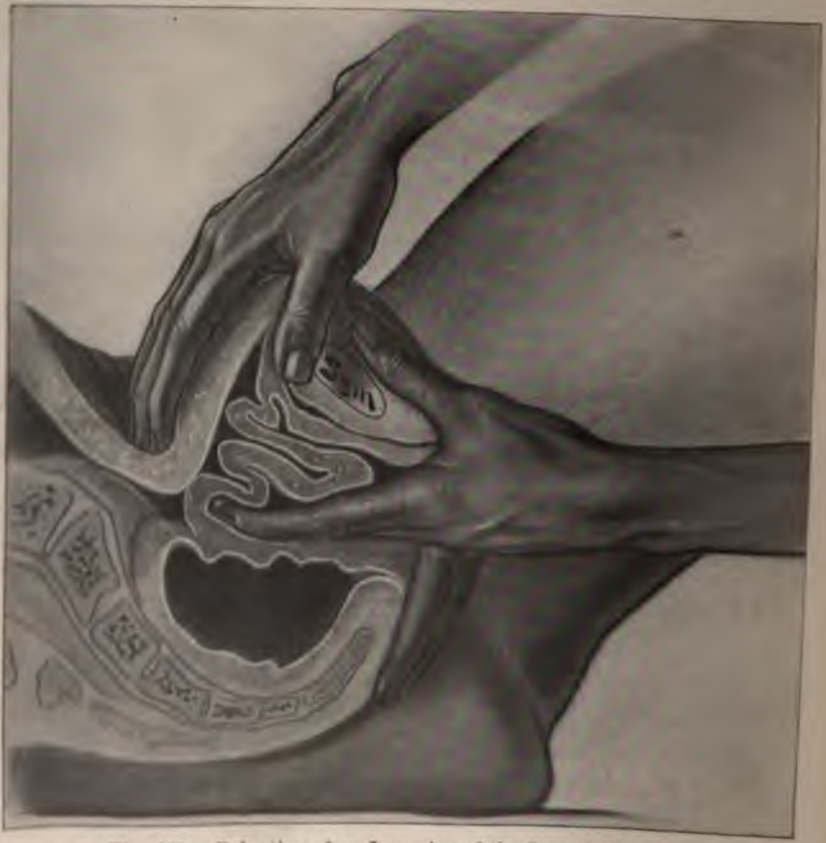

Fig. 400.—Palpation of an Inversion of the Second Degree.

version is rare. How much more frequently the partial form occurs is difficult to determine, as not infrequently partial inversion resulting from the presence of growths is overlooked. Puerperal inversion, in some cases, is produced by traction upon the cord in the efforts to deliver the placenta; by faulty pressure over the uterus the fundus may be inverted, and in the paralyzed condition may be grasped by the deeper structures and the inversion progress until it is completed. A short cord is an occasional cause for inversion. When the ominous traction is made upon the cord, the uterus is relaxed. The traction upon the fundus, and the subsequent uterine contraction, can more rapidly effect the displacement. Inversion rarely occurs spontaneously. The overdistention of the cervix by a large fetus frequently causes such relaxation as will permit inversion to occur readily. It will

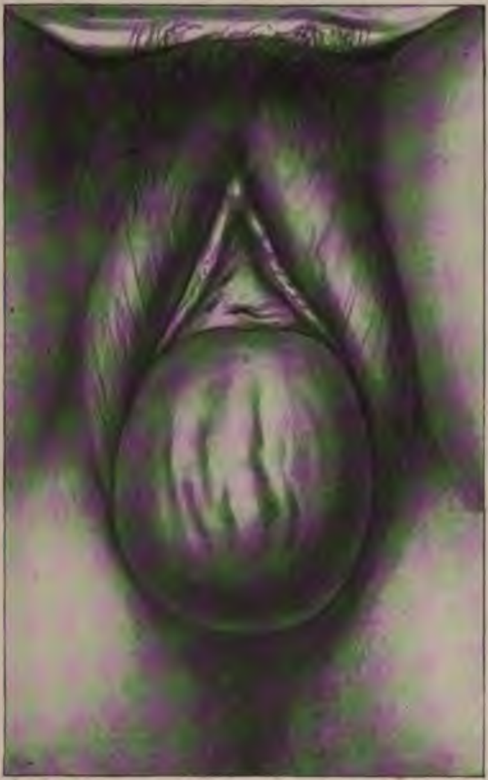

Fig. 401.—Appearance of Inversion of the Third Degree.

be a matter of interest to know whether, in the cases in which inversion has occurred, the placenta is attached to it near the fundus.

439. Symptoms.—Inversion causes characteristic symptoms. The patient generally complains of severe pain, which is continuous, sometimes days long; sometimes a sensation like pulling is felt in the vagina. Immediately following the dislocation a severe hemorrhage occurs. This continues in noteworthy strength the first day of the puerperium, and does not completely disappear, but may continue for some time. Later, it appears intermittent, but the suspension of discharge rarely corresponds in its duration to the normal intermenstrual interval. During the interval there is a profuse mucous discharge from the genitalia. The profuse blood discharge can cause the death of the patient from acute anemia, or later from septic infection. In some cases spontaneous reinversion may take place in the course of the year. The condition may be suspected from these phenomena.

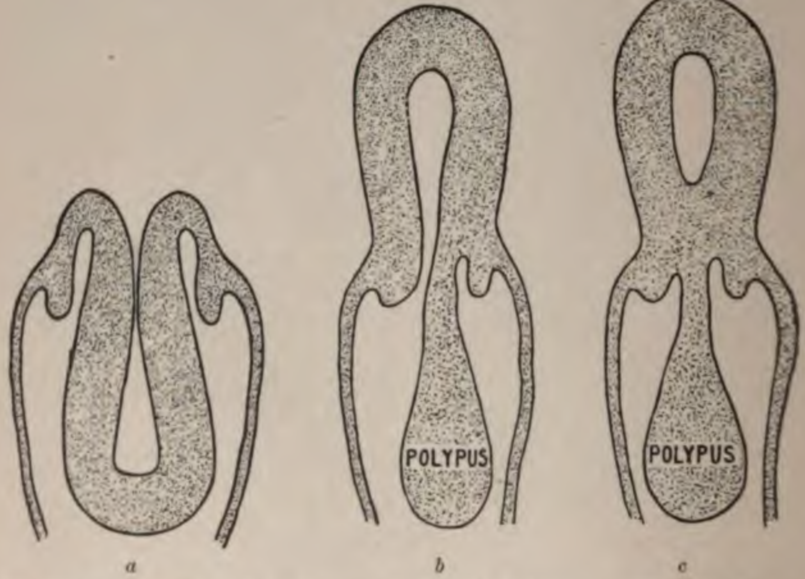

Fig. 402.—*a*. Inversion of the Uterus. *b*. Fibroid Polypus. *c*. Fibroid Polypus, with Stenosis of the Cervical Canal.

440. Diagnosis.—Inversion will be suspected from the severe pain, the more or less continuous hemorrhage, and the absence of the fundus uteri upon placing the hand upon the abdomen.

Digital examination discloses a globular mass which fills up the vagina and is encircled by a cuff-like ring at its upper part. This ring is situated at the external os. Placing the hand over

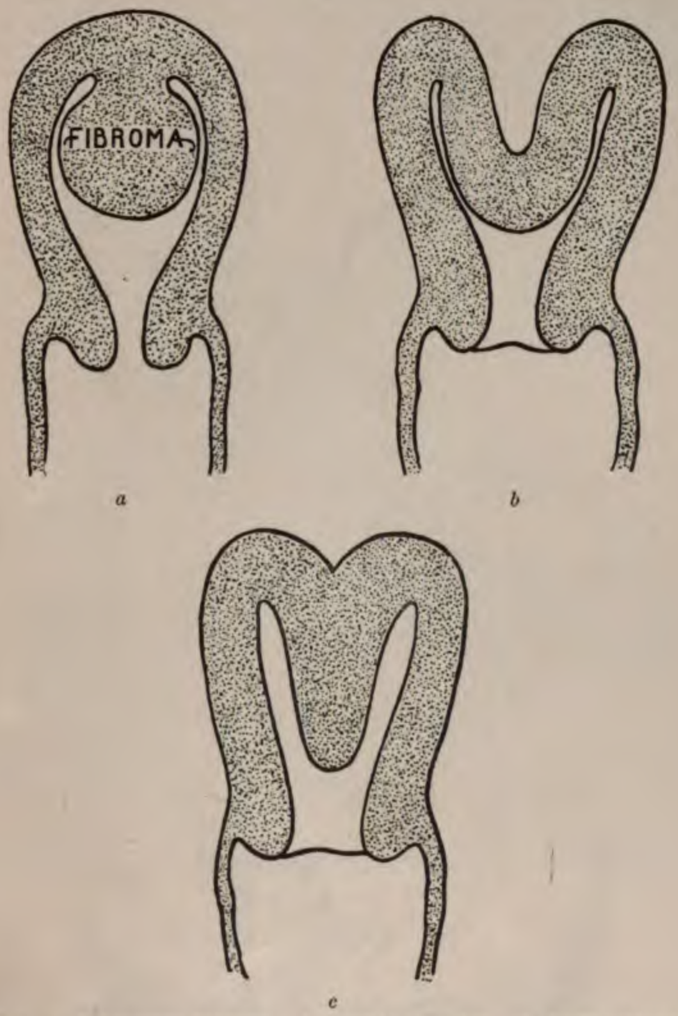

Fig. 403.—*a*. Submucous Fibroma. *b*. Partial Inversion. *c*. Partial Division of the Uterus.

the abdomen, and making deep pressure, the fundus of the uterus is found to be absent from its normal situation, and, instead, a funnel-shaped excavation is recognized, which is ordinarily

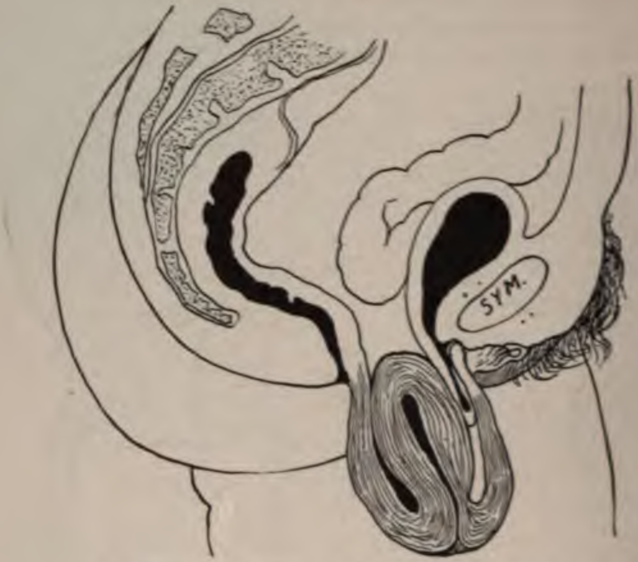

Fig. 404.—Prolapsus Uteri without Inversion.

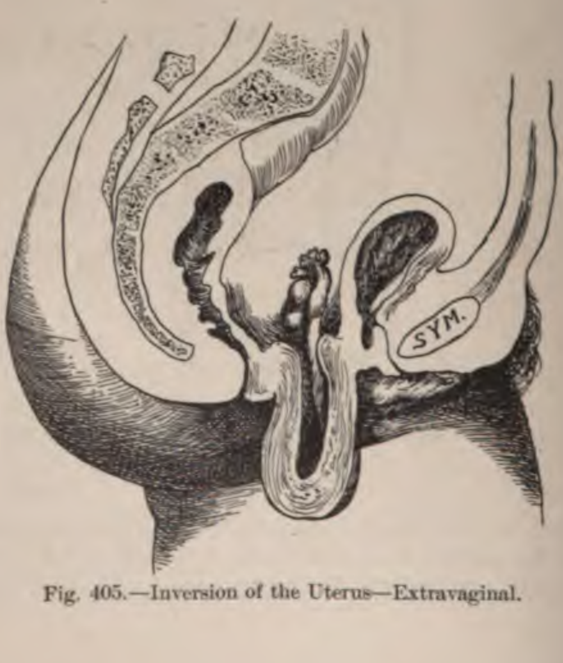

Fig. 405.—Inversion of the Uterus—Extravaginal.

sufficient to determine the diagnosis. In the chronic condition the uterus resumes its normal size, presents a globular or pear-shaped mass in the vagina, surrounded at its upper part by a distinct cuff ring, and the sound will pass into this the same distance on all sides. Bimanual examination discloses above a funnel-shaped depression. This depression can be more readily determined by drawing upon the fundus of the uterus and introducing the finger into the rectum, when it can pass over the neck and directly into this funnel. The ovaries and tubes are recognized near it or upon its margin. By investigation with the speculum the vaginal tumor is smooth, glistening, highly reddened and sometimes at its lower angles the openings of the tubes can be recognized. While a vaginal examination may afford a suspicion of the character of the disorder, the diagnosis is incomplete without a bimanual investigation which involves the rectum and belly cavity. When the abdominal walls are

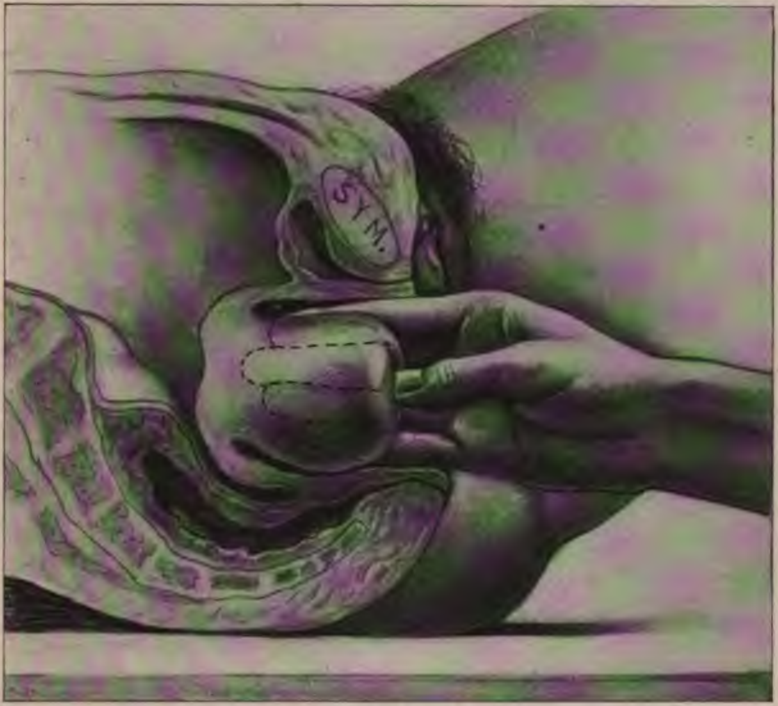

Fig. 406.—Central Taxis.

very thick and palpation is not readily determined, the introduction of a sound or a catheter into the bladder and of a finger into the rectum enables us to determine definitely the presence or absence of the uterine body. Inversion of the uterus is sometimes confounded with fibroid polypus which has been extruded into the vagina. Fibroid polypus may have a broad-based pedicle and the tumor may present a shape very similar to that of an inverted uterus. As it is covered with mucous membrane the superficial similarity may be marked. Of course, fibroid tumor will show no orifice of the Fallopian tubes, but the latter are not always distinguished. Sensation in the fibroid is a little less marked than in the inverted uterus, but is not sufficiently definite to afford a foundation for diagnosis. The sound carried around the cuff of the inverted uterus passes on all sides an equal distance. With fibroid tumor it would pass into the uterine cavity at one side. Occasionally, however, the cavity of the uterus may be so stenosed that the sound will not enter, and the diagnosis may then be uncertain.

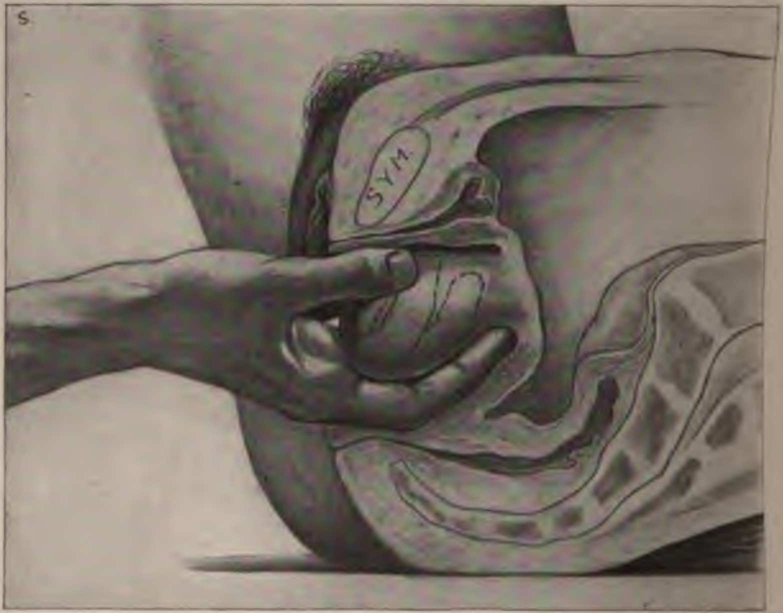

Fig. 407.—Lateral Taxis.

If we grasp the mass and draw it down, the finger in the rectum will disclose, in the one case, the cup-shaped depression of the inverted uterus; and, in the other, the body of the uterus lying above the neck of the growth. In a partial inversion, associated with fibroid growth, we may not be able definitely to determine the condition until we proceed to operation for the removal of the mass.

441. Treatment.—There is a difference in the treatment of the two forms of inversion. In the puerperal condition all that is necessary is to replace the uterus, when it will remain, while in the nonpuerperal form it is necessary to remove the growths which have occasioned it. Reinversion is comparatively easy in recent cases. Pressure against the fundus with the hand or fingers in the shape of a cone will be frequently sufficient to carry the hand directly into the cavity of the uterus and to accomplish its complete reinversion. After the puerperal condition has be-

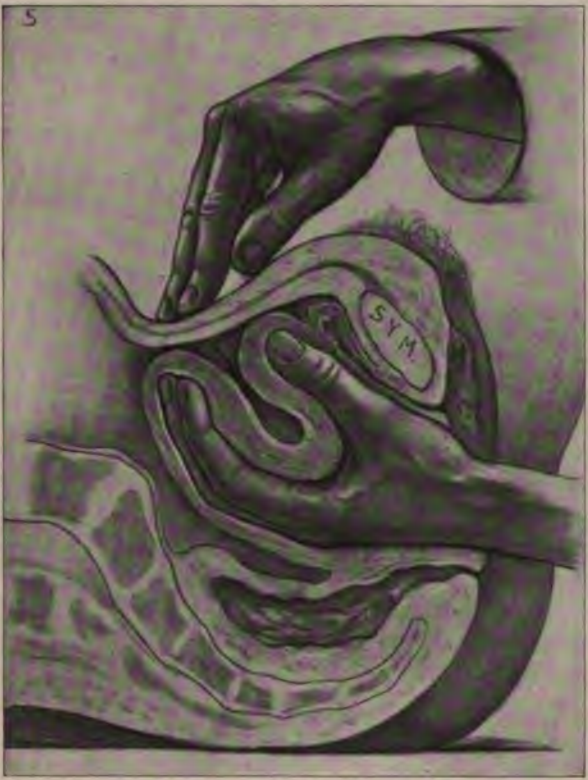

Fig. 408.—Peripheral Taxis.

apart the cervix. This soft pressure in some cases may be sufficient to accomplish the gradual reduction of the organ. The pessary can be introduced and the bandage so applied as to maintain the pressure against the cervix. A vaginal tampon of iodoform gauze for twenty-four hours is sometimes more effective than the pessary. The pressure is sometimes employed against the fundus by having an instrument with a cup-shaped end, into which the fundus fits, and a spring upon its external surface by which an elastic pressure is induced. This procedure is more effective when combined with Marcy's suggested insertion of two or more ligatures in the cervix, by which traction can be made upon it, while pressure is made against the fundus. Thomas advised opening the abdomen and dilating the cervix with an instrument similar to a glove-stretcher, while pressure is made against the fundus. This procedure was successful in one case and fatal in another. It has been suggested to introduce the index-finger of one hand into the rectum, and that of the other into the bladder, hooking them into the funnel-shaped depression of the uterus, while the thumbs are pressed against the fundus. Kuster advocates making a transverse incision through the posterior fornix of the vagina into Douglas' culdesac, through which

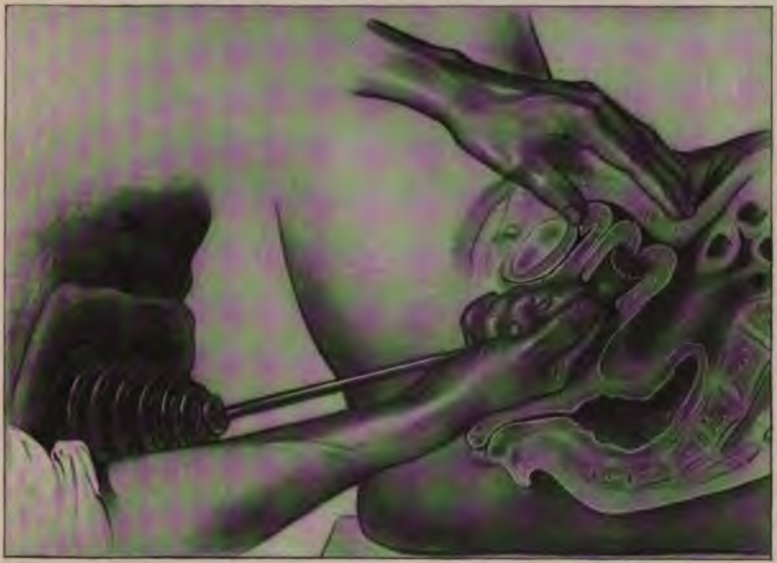

Fig. 410.—Reduction of Inversion with White's Apparatus.

he presses the index-finger of the left hand into the inversion funnel, and attempts with the thumb of the same hand to press up the fundus. If the procedure fails, he advises splitting through the posterior uterine wall, in the median line, by a longitudinal incision, which may extend to within two centimeters of the fundus, from the mucous surface to the peritoneal. The renewal of attempts at inversion under such circumstances are usually successful, for the reason that the resistance is removed and we are consequently enabled to replace the organ. After the uterus has been reinverted the fundus is turned down through the vaginal opening and a number of sutures are introduced to close the incision. If the conditions are unfavorable for an operation of reinversion, we can proceed to total extirpation of the uterus or to amputation of the inverted fundus. When the amputation of the fundus only

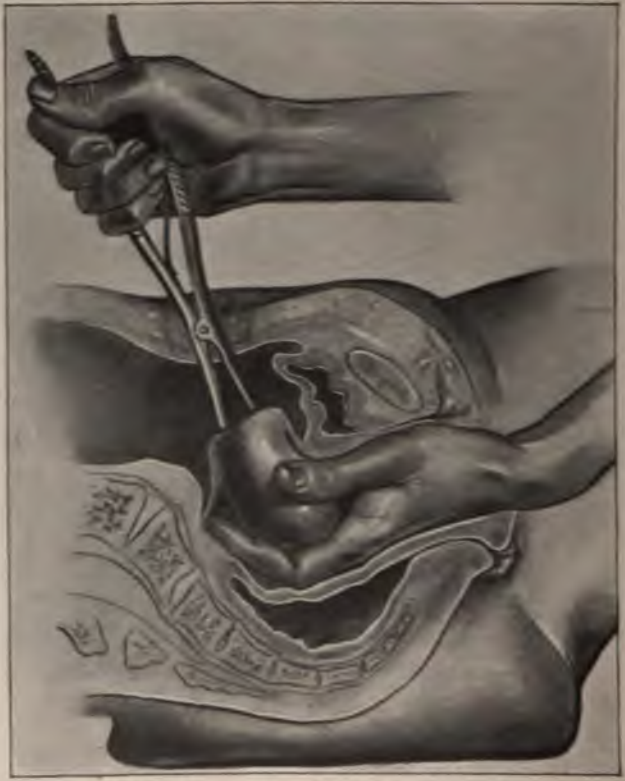

Fig. 411.—Intraperitoneal Dilatation of the Uterus.

is made, it is very important to guard against reinversion of the stump with a resulting hemorrhage into the peritoneal cavity. The stump may be secured by three or four partial ligatures, and then the amputation may be made below them. When the inversion is produced by the presence of tumors, we may content ourselves simply with the removal of the growths and the reinversion of the organ; or when the organ is very extensively involved, it may be necessary to remove the fundus with the growth. The possibility of partial inversion should always be kept in mind in operating upon partial extrusion of growths from the uterine cavity. Numerous cases are upon record in which the wire écraseur had been thrown around the base of the fibroid polypus or growth, and, after cutting through, it has been dis-

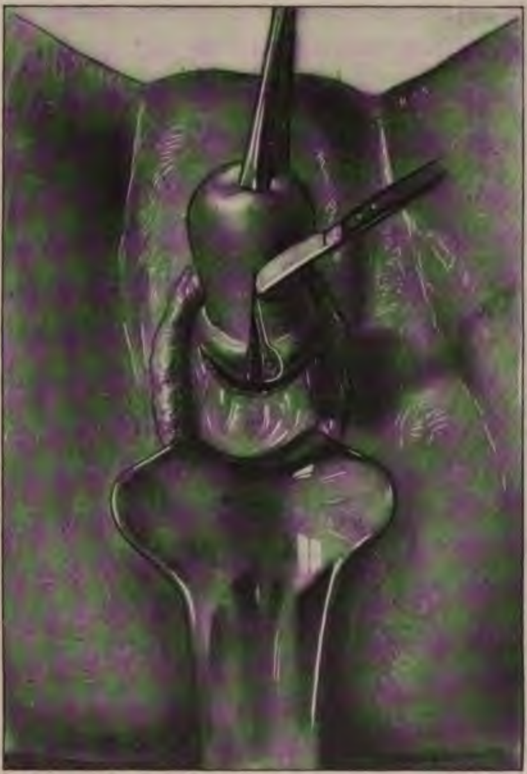

Fig. 412.—Incision of the Posterior Uterine Wall, Preliminary to Reduction of an Inversion.

covered that a section of the uterine wall has been removed. In such cases the preferable plan of procedure is the careful enucleation of the growth. The tumor is depressed and held while the enucleation is performed under the eye, so that, even though an inversion has occurred, by hugging the tumor closely we prevent breaking through the wall of the uterus.

442. Displacements of the Appendages.—Displacements of the ovaries and tubes are very common with backward uterine displacement. Inflammatory troubles in the tubes cause them to drop down, from increased weight, and they are found behind the uterus in Douglas' pouch. Frequently both tubes may be situated in this position, and, united at their abdominal ends, form a single tumor, which contains pus or serum. The tubes are dislocated by their attachment to growths; ovarian, fibroid, or broad ligament cysts may draw the tube up into the abdominal cavity and almost double its length. The most frequent dislocation of the ovaries is downward, into Douglas' culdesac. This prolapse can occur as a consequence of retrodisplacement, or, independent of it, from elongation or rupture of the infundibulopelvic ligament. The dislocation can be occasioned by enlargement of the ovary, or the hypertrophy may be secondary to the displacement. The complication of retrodisplacement with ovarian prolapse is a

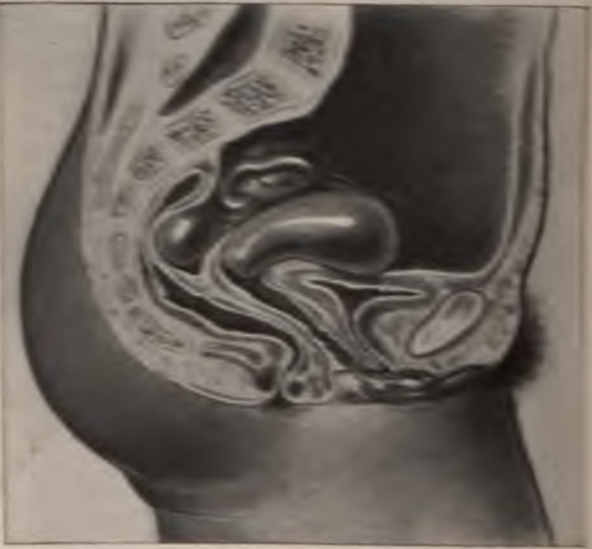

Fig. 413.—Prolapsus of Ovary and Tube behind Uterus.

source of additional distress and annoyance to a patient, as the tender ovarian structures are subject to pressure from the heavy uterus and from the passage over them of the contents of the bowel. In this situation they are also subject to pain and distress during the act of coition, often rendering it so painful that the act is dreaded by the patient.

443. Symptoms.—Prolapse of the ovary is generally associated with chronic inflammation, either as a primary or secondary condition. The symptoms from which the patients suffer are necessarily those which to some degree are occasioned by the chronic disorder. In addition to this fact, however, the patient suffers distress during fecal evacuation, during the act of coition, in walking, and on standing. The ache and distress are sometimes so severe as to render the patient unable to assume or retain the upright position; a condition of semi-invalidism and influence upon the nervous system is engendered similar to that present in chronic ovarian inflammation. There are no symptoms characteristic of tubal displacement.

444. Diagnosis.—Prolapse of the ovary, when freely movable, is readily determined by bimanual palpation. A mass can be felt posterior to the uterus in Douglas' pouch, which varies from the size of an almond to that of a small orange. These masses can be pushed up, and, as they arise in the pelvis, fall toward the side corresponding to the affected ovary, and drop backward as soon as the force is removed. When the ovary is enveloped with inflammatory exudate in the pelvis, it is more difficult to determine its situation, and, in fact, it may not be discovered until after the abdominal cavity is opened. Tubal enlargement with adhesions can frequently be mapped out as extending around the side of the uterus on its posterior surface, and the organs are more or less fixed.

445. Treatment.—In inflammatory conditions of the tube involving the ovaries the treatment is the same as that of the diseased condition, as described in Section 397. Prolapse of the ovary associated with chronic ovaritis, in which the ovaries are very much enlarged, is best treated by extirpation. When the enlargement is simply due to prolapse, causing more or less ovarian edema, the organ should be brought up and fixed in its proper position. Frequently shortening the round ligaments or ventrofixation will bring with it the restoration of the position of the ovaries. When these, however, do not rest upon the posterior surface of the broad ligament, but drag backward into Douglas' pouch, the infundibulopelvic ligaments should be shortened or the external end of the ovary should be stitched to the posterior surface of the broad ligament near its upper part. Efforts have or when the collection is so large as to involve all, it is denominated a *hematocolpometrosalpinx*. Further distinctions are retro-uterine, circumuterine, and ante-uterine hematocele, according to the situation of the blood collection—behind, about, or in front of the uterus.

448. Hematuria and Its Causes.—Hematuria is blood mixed with the urine, and can arise from urethral caruncle, polypi, vegetations, fissures (the latter situated about the internal meatus), and malignant disease of the canal. It occurs in acute and chronic cystitis, associated with more or less vesical ulceration; in the aggravation of the disorder occasioned by the presence of vesical calculi; and malignant growths or villous projections from the vesical mucous membrane are a prolific source for admixture of blood with the urine. It may still further be produced by injury, inflammation, or malignant disease of the ureters or kidneys. Stone in the pelvis of the kidney frequently causes bloody urine. Occasionally, blood appears in the urine as a result of constitutional conditions. So frequently is it associated with malarial infection as to give rise to the term malarial hematuria.

449. Symptoms and Diagnosis.—The blood may be mixed with the urine, giving it a dark, smoky, often almost black appearance, or may precede or follow the act of micturition, as a few drops of free blood mixed with the urine or in the form of a small clot. The clots may be bright and recent, or darkened by longer retention within the urine. Unmixed blood comes from injury or disease of the urethra; frequently a few drops or a small clot will follow urination when caused by a fissure of the meatus. When the bleeding is occasioned by disease or injury of the bladder, the urine is not constantly bloody. It may be perfectly clear and the next evacuation be bloody.

The situation of the disorder is determined after careful examination. Disorders of the urethral orifice are determined by inspection; of the canal, by palpation, and, if necessary, by inspection through an endoscope or a urethral speculum. Fissure of the internal orifice causes severe pain upon palpation of the urethra.

Inflammation of the bladder—cystitis—is recognized by painful and frequent micturition, blood-corpuscles, breaking-down tissue, and attacks of profuse bleeding. In growths or foreign bodies palpation discloses thickened walls, increased tenderness, and possibly the mobility of a foreign body or calculus. Microscopic investigation of the fluid evacuated is of great value. Not infrequently the bladder may be the seat of profuse bleeding, which becomes coagulated, and the clots interfere with the collection and evacuation of the urine.

clitoris, severe injuries of the vagina, extensive lacerations of the cervix, or malignant disease of the cervix or vagina. Hemorrhagic endometritis, fibroid growths encroaching upon the uterine cavity, and epithelioma, carcinoma, and sarcoma of the uterus are frequent causes. Hemorrhage from the genital tract may also result from disease outside the organ which interferes with its circulation; as inflammatory exudate, cellulitis compressing the vessels of the pelvis and interfering with the return circulation, displacements, extra-uterine pregnancy, intraligamentary tumors of the ovary or of the uterus, inflammation of the Fallopian tubes, chronic inflammation of the ovaries, and constitutional conditions which affect the circulation in the uterus (as, disease of the heart, of the kidneys, or of the liver). The circulation is very often temporarily influenced by the development of zymotic diseases. Severe uterine hemorrhage may frequently usher in an attack of typhoid fever. Disturbance of the process of gestation by hemorrhage may indicate the occurrence of abortion or of premature labor, or may follow abortion or labor where the secundines or portions of the placenta are retained. The hemorrhage may be more or less continuous, when it is known as metrorrhagia. Hemorrhage which consists in an increase or prolongation of the menstrual flow is known as menorrhagia.

452. **Diagnosis.**—The determination of the presence of hemorrhage, of course, presents no difficulty. It is exceedingly important, however, that we should be able to determine its cause; and this in some cases presents a matter of difficulty. No physician does justice to his patient who permits her to bleed without having subjected her to a careful examination in order to ascertain the cause. Not infrequently patients will object to an examination. Such a patient should be plainly given to understand that the physician can not continue to treat her unless she affords him an opportunity to know the existing conditions. He will do himself less injury by absolutely refusing to treat her than he will by yielding to her objection and endeavoring to palliate the trouble. Unfortunately, many patients have the idea that hemorrhage at or near the climacteric is a condition to be expected, so when free bleeding occurs at this period, they attribute it to the coming change of life, and continue to endure it. Members of the medical profession, I find, are often responsible for this condition, as they advise the patient that it is incident to her period of life, and that when this has passed over the hemorrhage will cease. It is, however, encouraging a transition from this to another state, and when the discovery is made, the time for radical measures has elapsed. The occurrence of hemorrhage incident to local or constitutional conditions makes

it incumbent upon us to interrogate carefully every organ of the body to make sure of its cause. When a woman in whom we are able to eliminate constitutional conditions, and in whom we can discover no disorders in the tissues about the organ, nor any disease of the cervix to explain the cause, suffers from hemorrhage, we are then obliged to explore the uterine cavity. The previous history of the patient will have enabled us to determine whether by any possibility a recent pregnancy should be the cause, through retention of any of the productions of gestation. By bimanual examination we are generally enabled to determine even small growths and increase in size of the organ, as a point of resistance, in which we can determine the growth. Some of these growths, being pedunculated, can be moved about in the uterine cavity to a limited degree. Combined palpation also enables us to determine something of the condition of the organ in its relation to possible malignant disease, which occurs more frequently in the cervix. When it exists in the body of the organ, we will generally find, at some point of the organ, a sensation of greater resistance, or a rigidity instead of an elasticity. This, of course, depends entirely upon the amount of inflammation. If the disease involves only a portion of the lining membrane of the organ, without an infiltration extending into the uterine wall, bimanual examination will not afford light; then it will be necessary to explore the uterine cavity, which is preferably done with the finger. The finger within the uterus, and the hand over the abdomen, enables us to outline and definitely determine the thickness, rigidity, and presence of induration or exudation, and the condition of the uterine mucous membrane. We can not, in the nonpuerperal uterus, however, readily introduce the finger into the cavity of the organ, so that we must employ means to accomplish dilatation. Dilatation may be performed by a variety of methods, one of which is the employment of mechanical dilators or of graduated bougies. This form affords an excellent opportunity for therapeutic measures within the uterus, but sufficient dilatation of the organ can not be accomplished thus to permit the introduction of the finger without tearing the structure of the cervix. The cervix may be split on either side to the internal os with scissors or a knife, when the organ can be dilated or stretched enough to permit the introduction of the finger. Even this method of procedure is associated with a tearing of the uterine structure, and splitting the cervix is too radical an operation for mere exploration. It is only when it is necessary to consider the treatment of a threatening condition within the uterine cavity that we would consider the cervical incision. Another method of dilatation is that of Vulliet, which consists in packing the uterine cavity with pieces of gauze until the cervix becomes gradually dilated, and renewing this gauze packing until the uterine cavity is so well dilated that the finger can be readily introduced. This plan is open to the objections, however, that the gauze is an irritant, requires care that the patient does not become infected with sepsis during the progress of the procedure, and in many cases, particularly when the cervix is the seat of inflammation and is a little rigid, the dilatation is ineffectually accomplished.

The most effective method of dilatation is that by the use of tents. These may be sponge, laminaria, or tupelo. Sponge tents are objectionable on account of the difficulty of rendering the sponge sterile and because of the fact that it becomes impregnated with the discharges, which quickly decompose and cause danger of infection. The laminaria tents are exceedingly effective, preferably those which are perforated. The tent should be introduced into the uterine cavity without much force, the tent and the canal having previously been rendered as far as possible sterile. As large a tent as can be introduced should be used, and when the cavity is somewhat dilated, or when the first tent is not sufficiently large and we wish for more complete dilatation, a number of tents, or a nest, can be employed. The details of the procedure and the precautions to be exercised have been given. (Section 77.)

453. **Treatment.**—The treatment is the same as that of the condition which has caused the hemorrhage. We may not, however, be ready, or the patient can not be subjected to immediate treatment, while the hemorrhage is so severe as to necessitate the exercise of measures to save her life. Various remedies are advocated for relief of hemorrhage—agents which exercise contractile power upon the involuntary uterine mucous membrane, of which ergot is one of the most efficient. It not only causes contraction of the uterine muscle-wall, but also decreases the amount of blood that is sent into the uterus through the contraction of the uterine vessels. Thyroid extract and the extract of mammary gland have been highly extolled. The various astringents are of benefit, as gallic and tannic acids; dilute sulphuric acid; iron salts, especially the persulphate of iron; hamamelis; hydrastis and its salts, hydrastin and hydrastinin; and the tincture of cinnamon. The latter may be given with good effect in combination with either gallic or tannic acid, giving from ten to fifteen grains of the acid with a tablespoonful of the liquid. The patient should be kept perfectly quiet in bed; if hemorrhage is severe, she should be interdicted from rising even to evacuate the bowels or to void the urine. Cold applications

may be applied to the abdomen, and heat or a mustard plaster between the shoulders, in order to divert the current of blood from the pelvis. Local applications of various astringents, as alum, zinc sulphate, hydrastis, or hamamelis, used in strong solution or as a douche, may be used. Douches of hot water should be given the patient while in the recumbent position, using water at from 110° to 115° F., even 120° F. if the patient can bear it. Applications to the uterine canal by injections of a few drops of perchlorid of iron may be employed, or the cavity may be swabbed with it. The objection to the injection is that the uterine cavity will contract upon its contents, causing contraction of the cervix, by which the contents are forced from the uterine cavity into the tubes, and produce inflammation within them, or, worse, a localized peritonitis. A solution of aluminium acetate has been advocated. When hemorrhage is severe, endangering the patient by its continuance, the uterine cavity should be tamponed, by packing a good-sized piece of gauze firmly into the uterine cavity, which prevents the further discharge of blood and facilitates the dilatation of the canal until it can be explored. These measures for the treatment of hemorrhage are merely palliative. They do not correct the fault or the trouble which induced it; and the earlier radical treatment can be instituted, the better it is for the patient and the more readily is the condition controlled. Slight bleeding from the vulva and vagina is readily controlled by making applications of an astringent or a styptic, such as persulphate of iron, directly to the diseased surface. The cavity should be packed, in order to secure further improvement through pressure. When bleeding occurs from an injury of the vulva, the most efficient means is to enlarge the external injury and to secure the bleeding vessel by ligation. When a large surface bleeds, the hemorrhage is best controlled by packing with iodoform gauze, making firm pressure upon or into the wound.

454. Vulvar Hematoma or Hematocele. — Vulvar hematoma or thrombus is a hemorrhage which takes place into the tissues of the vulva. It arises as a result of injury sufficient to cause rupture of a vessel without a break in the integument. When the injury involves the bulb of the vestibule, the hemorrhage may be extensive, and cause a large-sized tumor, which involves one or the other large labium. It also occurs from rupture of varicose veins or from compression of vessels during the progress of labor. The latter is the most frequent cause. The tumor may attain the size of an orange or even of the fist, and may be very tense and painful. It usually occurs suddenly, and is associated with more or less burning and pain in the region of the swelling while it develops. When the skin is unbroken and the collection does not become infected, it may be completely absorbed.

455. Diagnosis.—Vulvar hematoma is likely to be confounded with edema of the labium and with labial tumors. Its development, however, is too sudden for the latter conditions. Edema of the labium is generally associated with other disorders. It is not one-sided; both labia are involved unless the edema is due to some special cause, in which there is obstruction of vessels or lymphatics on one side only. Vaginal thrombus is very frequently associated with vulvar, so it becomes known as vulvo-vaginal, occurs upon the side of the vagina, and is most frequently a result of injuries during labor. The head of the child frequently pulls off and stretches the attachments, and causes rupture of vessels and severe bleeding. The tumor may attain a very large size, compress the vagina and rectum, and cause difficulty in micturition. The physician may be in doubt, when called to see such a patient, whether it is an accumulation of blood or a suppurative process. The better plan of procedure is at once to undertake careful examination. With the history of the patient in mind, we may be able to eliminate the probability of its being inflammatory, especially when it occurs shortly after a confinement. I saw, during the year 1898, a patient thirty-four years of age, three weeks after her first confinement in a fairly normal labor, with but slight laceration of the perineum, which was repaired, who at the end of two weeks had some elevation of temperature, with more or less distress in the pelvis, and examination disclosed a swelling, which protruded into the vagina and rectum. The space thus formed was pretty large. The right buttock was edematous, and the mass was pushed into the vagina to such a degree as greatly to obstruct it, as well as to encroach upon the rectum. The sensation of fluctuation was indistinct. The right buttock was so much more prominent than the left, and the sensation of elasticity, almost fluctuation, was so marked, that I decided to incise through it, and thus reach the mass, rather than to make an incision from the vagina. The incision into the buttock, however, disclosed that the swelling in it was entirely edematous. From the buttock incision the levator ani muscle was incised, when there was at once a discharge of a large quantity of bloody fluid and clots. By pressure through the vagina the mass was readily removed, and the patient looked, and expressed herself as feeling, very greatly improved. A piece of gauze was passed through the wound into this cavity, with a view to insure drainage and to prevent its premature closing. This gauze was removed at the end of twenty-four hours. The subsequent progress of the patient was uninterrupted.

456. Vaginal hematoma or thrombus uncomplicated is of rare occurrence. It is usually associated with hemorrhage into the vulvar tissues, forming the already described vulvovaginal thrombus. When it does occur, it is almost exclusively a sequel of labor. The structures pushed before the head of the fetus cause rupture of pelvic vessels, from which hemorrhagic collections result.

I saw such a hematocele result from pressure during labor upon an ovarian dermoid, the union of which with the uterus had been destroyed by previous torsion. The tumor was sustained and nourished by a broad band of adhesion above to the omentum, and below by peritoneal folds which extended over and to the left of the bladder. In the latter fold, and dipping down into the pelvis in front of the bladder and vagina, and to the left of the latter, was an extensive collection of clotted blood, which had evidently been produced by pressure upon the tumor and its inferior attachments during the progress of labor.

457. Treatment.—The amount of bleeding, in these cases, is usually limited, as the pressure of the tissues into which bleeding occurs controls it. In noninfected cases the extravasated mass is ultimately absorbed. When small, it may, without detriment to the patient, be left to nature; but when the collection is large, the pressure produces thinning of the enveloping wall and permits the ready introduction of infecting germs, either from the rectum or the vagina. In such collections the danger of subsequent infection is reduced by free incision and the evacuation of the accumulation. Not only should the clots be removed, but measures must be instituted to preclude further hemorrhage. A large bleeding vessel may be secured by a ligature passed beneath it or about it by means of a needle. When ligation is impracticable, it should be controlled by packing with iodoform gauze. The gauze should be retained for two or three days, and should be renewed with a smaller amount, in order to keep the external wound open until the cavity has filled up.

458. Peri-uterine hemorrhage may be intraperitoneal or extraperitoneal. Intraperitoneal hemorrhage, unless preceded by inflammatory adhesions which form limitations, is free, and may be large in quantity. Extraperitoneal hemorrhage takes place into the cellular tissue about the uterus and the broad ligaments, and is limited by the pressure of the tissue. Hemorrhage into the cellular tissue beneath the peritoneum undergoes coagulation and forms a bloody tumor, which is known as a hematocele. It is analogous to the thrombus which occurs during the progress of labor, and which we have described under the term vulvovaginal.

Hemorrhage into the peritoneal cavity will form a coagulum, and subsequently a tumor, or, when very free, may remain liquid and the hemorrhage continue until the death of the patient or until surgical intervention.

459. **Causes.**—The causes may be divided into two classes: first, hemorrhage that results from intra-uterine pregnancy, which is more important, because more frequent and more serious in its results; second, hemorrhage of nonpuerperal origin, in which it occurs without the existence of fecundation. The pelvis being the most dependent portion of the abdomen, hemorrhage from any of the intra-abdominal viscera, or within any portion of the peritoneal cavity, naturally gravitates into the pelvis. Thus, we may have intra-abdominal hemorrhage from traumatic injuries of the liver or spleen, rupture of an aneurysm of the aorta or of the celiac axis, rupture of varicose veins, from the ovary, regurgitation from the Fallopian tube of menstrual blood (particularly when there is obstruction of the uterine neck), rupture of a uterine or tubal collection, rupture of bands of adhesion in the pelvic peritoneum, slipping of a ligature, or the retraction of a cut vessel following an operation. Any of these may cause an accumulation of blood in the pelvis or, particularly, in Douglas' pouch, whereby, through the presence of gas within them, the

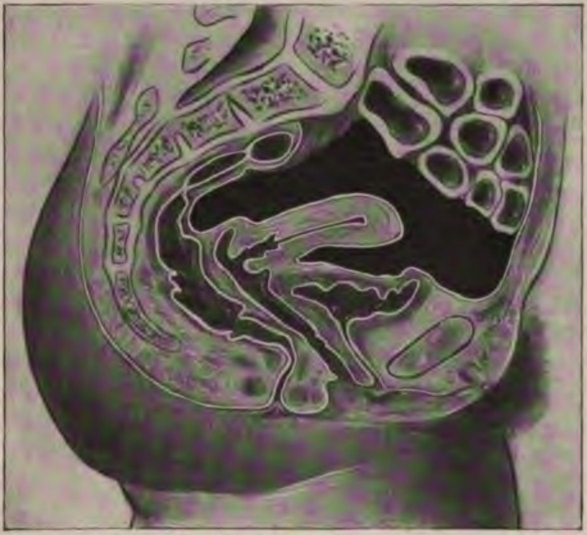

Fig. 414.—Intraperitoneal Hemorrhage.

intestines are floated up, the uterus can be pushed forward, and the coagulation leads to irritation of the peritoneum and to the formation of adhesions, by which the collection may become encysted, to form what is known as an intraperitoneal hematocele. The most frequent cause, however, belongs to the division of the puerperal or extra-uterine.

460. Symptoms.—When the hemorrhage is due to extra-uterine pregnancy, the condition is preceded by disordered menstruation; possibly the patient has missed one or more periods. She has had the ordinary symptoms of pregnancy, and has supposed herself to be pregnant. She has felt pain of a severe, cutting character on the affected side, which possibly has become paroxysmal and quite intense in character; or there may be, without any premonition, a violent attack of tearing, cutting pain, which causes the patient while standing to drop and become unconscious; or repeated attacks of syncope, with countenance becoming pale, anxious, and covered with clammy perspiration, with lips pale and blanched, respiration sighing, the sight obscured, sensation of blindness, mind frequently wandering, or the patient unconscious or passing from one syncope into another, the pulse at the wrist becoming exceedingly feeble, faint, or imperceptible, and all the indications of approaching dissolution. According to the intensity of the hemorrhage, the patient may either die in the first attack—that is, within half an hour or an hour after the first symptoms—or slightly rally, and apparently a recurrence of the hemorrhage occur, with death in less than twenty-four hours. Should the patient survive twenty-four hours and rally, she may gradually regain her strength and recover, or a secondary hemorrhage may follow and a fatal result occur. In the early stage of the trouble no physical signs of the existence of hemorrhage can be determined. Possibly, with a large quantity of blood exuded in a thinned abdomen, we may recognize it by the sensation of fluctuation. After twenty-four hours blood begins to accumulate in the pelvis, and we recognize through vaginal palpation the sensation of fluctuation and a slight resistance. Changing the position of the patient would permit this to flow out, and its presence could no longer be recognized, when, by again lowering the pelvis, the accumulation returns to it. Changes which occur in the coagulation of the blood result in the formation or throwing-out of plastic material and in the development of a localized peritonitis. The abdomen becomes tender to the touch; a reaction of temperature occurs; instead of being subnormal it now rises to 101° F., even 103° F. The patient may suffer from distress from the pressure of this mass upon the rectum or from pressure against the uterus and bladder, causing frequent micturition, or even incontinence. Associated with the plastic peritonitis, the patient has nausea and abdominal distention. Because of this process the accumulation becomes encysted in the pelvis. Its watery portions are partly absorbed, leaving a more consistent and resistant mass, which pushes the uterus upward and forward; the intestines are raised above it, and it affords a very good idea of the character of the trouble. The mass varies in its consistence—sometimes hard, in others soft; or, in the same mass, we may have points of softening. The uterus may be enveloped in the tumor, producing what is known as a circumuterine hematocele. Rectal examination may be interfered with by the compression of the mass, which not infrequently presents symptoms of internal strangulation, with retention of the urine, and, by its pressure, produces acute neuralgia of the lower extremities. Even when suppuration does not occur, we find frequent irregular attacks of fever, due to peritoneal reaction, produced by the formation of false hemorrhage. The course of such a disease is essentially chronic, or we may have successive acute attacks. The congestion which takes place at the menstrual periods may result in acute symptoms. Suppurative inflammation in such a condition is ushered in by an aggravation of the general symptoms, by chills, and by profuse sweating, and the tumor, increased in size and softness, may subsequently perforate into the rectum, and cause an evacuation of dark, purulent, exceedingly offensive material, affording black, fetid stools, and producing more or less irritation of the rectum. These discharges are followed by a cessation or disappearance of the tumor. Perforation into the vagina or bladder may also occur, although these are more rare. Perforation into the abdominal cavity is fortunately rare, and when it occurs, causes a violent attack of general peritonitis.

461. **Extraperitoneal Hematocele.**—Extraperitoneal hemorrhage resulting in the formation of hematocele may occur from any of the conditions named as productive of the intraperitoneal variety.

462. **Symptoms.**—Extraperitoneal hematocele into the broad ligament is limited in its character, and causes symptoms similar to those which have already been enumerated for the intraperitoneal variety, though in a much slighter degree. The indications of shock and collapse are much less marked, and hemorrhage, from its limitation, is much less serious in its influence. As it occupies the broad ligament, it is usually situated upon one side of the pelvis, and pushes the uterus to the opposite side. This hemorrhage may be situated either in the upper part or in the base of the broad ligament, and may produce different phys-

ical signs according to its situation. The hemorrhage, when low in the broad ligament, may dissect forward between the uterus and bladder, or backward around the uterus beneath the peritoneum, and extend to the opposite side. In the great majority of cases, however, extraperitoneal hemorrhage is one-sided.

463. **Diagnosis.**—Peri-uterine hemorrhage, whether intraperitoneal or extraperitoneal, is determined by the phenomena of internal hemorrhage. It is true that similar symptoms—a sharp pain, symptoms of collapse—might arise from rupture of a pyosalpinx or pelvic abscess. In such accidents, however, acute agonizing pain is caused, with symptoms of peritoneal reaction which are more intense than from the hematocele, but a tumor does not form. A retroflexed gravid uterus may be mistaken for hematocele, but the outline of the boundaries of the organ are more definite than those found in hematocele. In the latter the uterus is frequently inclosed within a mass or pushed forward, while by a careful examination in retroflexed gravid uterus the cervix is found at a higher level, either in the axis of the vagina or looking forward; a distinct angle exists between it and the smooth, definitely outlined mass filling up the pelvis, which should not be

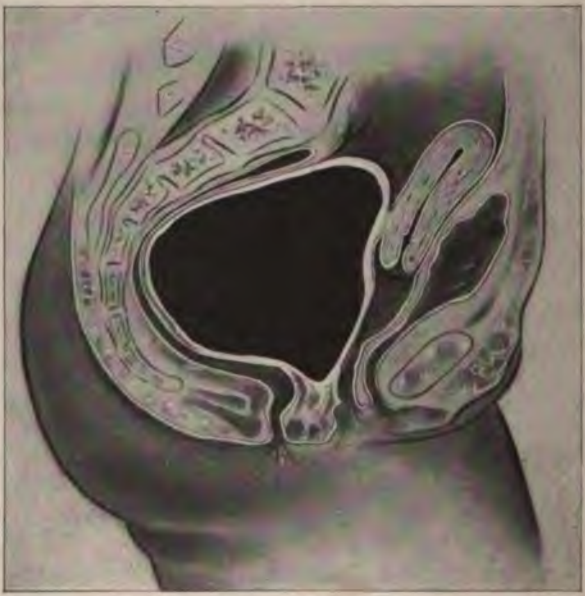

Fig. 415.—Extraperitoneal Hematoma.

confounded with hematocele. Ovarian cysts and uterine fibroids imprisoned within the pelvis possesses nothing in common with hematocele. The manner of appearance and the course of development of the condition are entirely different. Extra-uterine pregnancy before rupture does not present similar symptoms, although it may be a starting-point for the later hemorrhage, and unless the examination is carefully performed, rupture may result from the methods used for diagnosis. Extraperitoneal hemorrhage is determined from intraperitoneal by the situation of the collection upon one side, which is more definitely localized, its boundaries more sharply defined, and the uterus generally pushed to the opposite side, while in the intraperitoneal hematocele the latter is surrounded by the accumulation or is pushed forward. The determination of the cause of the hemorrhage is not always easily accomplished. Previous symptoms of pregnancy, amenorrhea, with symptoms rapidly ushered in, profound depression, and very marked anemia, should lead to the suspicion of probable rupture of a fetal cyst. Symptoms of collapse, or depression, of internal hemorrhage, may arise from rupture of internal varicose veins. In hemorrhagic salpingitis the condition is more insidious, the progress more slight, owing to the gradual effusion of blood.

464. **Prognosis.**—The affection is always a serious one. We can not be certain that death may not suddenly result from a continuation of the hemorrhage, or, when hemorrhage has apparently been arrested, that the clot may not be loosened and hemorrhage again recur. In large collections the progress of the case is exceedingly tedious. Plastic material remains about the uterus for a long time, becomes more or less organized, is frequently a source of discomfort, and often a cause of sterility. That sterility is not invariably caused is evident from the numerous cases recorded in which women have suffered from hematocele, in whom the collection is ultimately absorbed, and the patient again becomes pregnant extra-uterinely, and the experience is repeated. The presence of a large collection of blood within the pelvis is a source of continuous danger, from its close proximity to the vagina and rectum, through either of which channels infectious material may enter, to cause pelvic suppuration. Suppuration is particularly likely to occur if the individual has had previous tubal disease, from which, doubtless, the infection develops. The extraperitoneal variety is less serious in its influence, much more likely to undergo absorption, and leaves less evidence of its previous existence. Its situation renders it less susceptible to infective changes. When the collection is large, however, and has existed for some time, the patient will,

without question, have a more favorable prognosis through the exercise of measures for its removal.

465. Treatment. — Active interference must depend very much upon the character of the symptoms and the severity of the attack. When the symptoms are such as to indicate extra-uterine pregnancy, with rupture of the sac and escape of a large quantity of blood into the pelvis, the abdomen should be opened promptly, clots removed, and the bleeding vessel secured. In profuse internal hemorrhage ligation of the bleeding vessel is just as certainly indicated as in hemorrhage from the radial or femoral artery. When hemorrhage has apparently been arrested and a reactive peritonitis develops, we are not absolutely certain that the clot can not be displaced and the patient suffer from a recurrence of hemorrhage, which may be fatal, or that the collection of fluid about which nature is forming its barriers may not become infected from the neighboring hollow viscera and cause subsequent changes, necessitating its evacuation, with increased danger to the patient. In extraperitoneal hemorrhage the indications for operation are not so marked. The symptoms are much slighter, the amount of exudation is less, and the probabilities of infection are diminished. In such cases we can afford to wait and trust to nature to absorb the effused fluid. In large collections, however, much time will be saved by its evacuation. The method of operative procedure will depend upon the time the condition comes under observation. In an acute attack, and with an evidently bleeding vessel, we should follow the procedure which affords the most accurate and complete exposure, with the most ready access to the field of hemorrhage. Abdominal incision meets every indication, as through it we are enabled to see and to reach the bleeding vessel. When the patient, however, comes under observation a week or more subsequent to the hemorrhage, when the peritoneal reactive processes have resulted in the blood becoming encysted, and vaginal and abdominal palpation disclose that barriers have been formed by plastic exudate between the knuckles of intestine over the surface of the hematocele, the vaginal incision is the preferable procedure. This procedure is preferable for the reason that it respects the barriers which nature has constructed to limit the collection, and affords a free opportunity for the evacuation of the clots. They are removed by the finger and by irrigation. With gauze packing and a free vaginal incision the subsequent progress of the case is much less severe and the length of the convalescence is decreased. When blood has been effused into the peritoneal cavity, and clots have formed, by neither the abdominal nor the vaginal method would we be able to remove all the clotted blood. The clotted material remains adherent to the sides of the sac and pelvis, and is likely in either procedure to cause a certain elevation of temperature as a result of the fermentation taking place in the retained fibrin. When the condition has gone on to suppuration, there should be no question as to the preferable procedure of reaching the collection, when accessible, through the vagina, rather than by the abdominal route. It should be remembered that not all cases of internal hemorrhage are necessarily fatal nor require operative procedure. If the patient is unwilling to undergo an operation, or the conditions do not urgently demand it, the promotion of absorption should be accomplished by keeping the patient absolutely at rest in bed, by the use of the catheter to empty the bladder, and by the evacuation of the bowels or intestines by enemata. Absolutely interdict the use of opium, keep the vagina antiseptic by repeated douches, and when it is supposed that hemorrhage still continues, or that it is in danger of being renewed, apply an ice-bag over the abdomen, introduce ice suppositories into the rectum, and thus bring the ice in close contact with the bleeding vessels. In extraperitoneal hemorrhage indications for operation are much less marked. The absorption may be promoted by keeping the bowels regular and the patient at rest, and by the application of cold over the abdomen or of counterirritants. When operative interference seems indicated, the preferable procedure would be to make an incision through the vagina into the broad ligament, tear with the finger or a blunt instrument through the tissue of the ligament until the hematocele is reached, then enlarge the opening, turn out the clots, irrigate the cavity, and introduce gauze to afford vent for further discharge. When the collection is very large, it may sometimes be reached by an incision above Poupart's ligament, to the peritoneum; push the latter up, and thus proceed until the collection is exposed, opened, and the collection of clotted or broken-down blood is evacuated. The cavity can be treated, as before recommended, by gauze packing.

466. Extra-uterine Pregnancy.—By extra-uterine pregnancy or ectopic gestation is understood the development of the ovum outside its normal situation within the uterine cavity. Much difference of opinion exists as to the point at which the union of the spermatozoon and the ovum, and its consequent fecundation, takes place. Tait very firmly asserted that in the normal condition this fecundation always occurred in the uterus. Others as emphatically believe that fecundation may occur at any point between the internal os and the exit of the ovum from the Graafian follicle. The recognition of the fact that in the lower animals the spermatozoa in normal conditions are found in contact with the ovary would seem to afford justification for the belief that fecundation does not absolutely occur within the uterine cavity. Fecundation more than likely does take place in the tube, and the changes which occur as a result of fecundation produce alteration in the uterine mucous membrane, preparing it for the reception of the fecundated ovum.

467. Causes.—The occurrence of extra-uterine pregnancy has been attributed to the existence of inflammatory conditions in the tube, which produce changes in the tubal mucous membrane: as, loss of ciliated epithelium, and denuded patches which tend rather to arrest than to facilitate the progress of the fecundated ovum; contractions in the tube from inflammatory changes, and diminished peristaltic action as a result of perisalpingitis; obstacles to the progress of the ovum, such as intratubal polypi; and emotional conditions of conception. Were the latter an important factor, however, we should be likely to find tubal gestation more frequent in illegitimate cases. None of these conditions, however, always explains tubal gestation, for we find such pregnancies occur in cases in which examination has disclosed the normal tubal ciliated epithelium above and below the situation of the ovum. It is probable that in some cases a fertilized ovum at once engrafts itself upon the adjacent mucous membrane. An extra-uterine gestation may occur at any period of fertile life as a first pregnancy, or in women who have borne a number of children. Long-continued sterility is given as a cause; thus, it may occur in a first pregnancy in women who have been married eight, ten, or twenty years; or in cases in which a woman has not given birth to a child for five or six years; or, again, it may follow immediately a labor or an abortion. Both tubes may be pregnant concurrently, or one tube may contain a tubal pregnancy, or a tubal may complicate a uterine pregnancy; and in one case reported there was a twin pregnancy in the outer portion of the tube and a single pregnancy at its uterine end, an interstitial, making three embryos in the one tube.

468. Varieties.—Extra-uterine pregnancy in the great majority of cases is tubal. Apparently, definitely determined ovarian pregnancy has been recognized, but the cases are rare. Tubal gestation occurs most frequently in the central portion of the tube. It may occur, however, toward its abdominal end, and, as it enlarges, is extruded or partly extruded, comes in contact with the ovary, and is known as a tubo-ovarian pregnancy. When it is situated within the central portion of the tube or ampulla, it is known as a tubal pregnancy; toward the uterine end of the tube, in the isthmus, it is called a tubo-uterine or interstitial pregnancy. Rupture of the tube, with partial escape of the ovum,—which, however, retains its placental attachment,—may permit it to develop subsequently, when it becomes an abdominal pregnancy. Abdominal pregnancy, however, is secondary, and not primary.

469. Course and Progress.—The fecundated ovum in contact with the tubal mucous membrane causes the tube to become turgid and vascular. The villi are implanted upon the mucous membrane and the wall stretches and becomes attenuated and thin. The mucous membrane is stretched and its folds are effaced. As the tubes vary in thickness and length, the rapidity

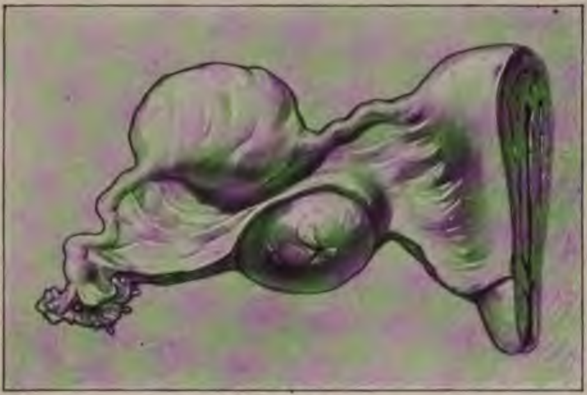

Fig. 416.—Tubal Pregnancy.

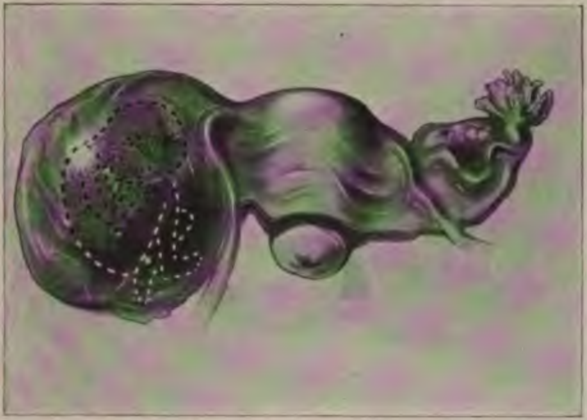

Fig. 417.—Tubo-ovarian Pregnancy.

of thinning correspondingly differs. When the ovum is situated in the outer third, changes result in the ostium. During the first four weeks the fimbriæ are swollen, with turgidity of the adjacent muscular and serous tissues. The fimbriæ are gradually retracted, while the peritoneal margin of the ostium forms an irregular ring, which in four and one-half weeks projects beyond them. It finally contracts, and at the end of the eighth week is completely contracted and hermetically sealed. This occlusion is not constant. Occasionally, the ostium dilates. The occlusion is less likely when the ovum is situated within the central portion of the tube. The situation of the ovum and the condition of the ostium affect the subsequent progress. The gravid tube with occluded ostium always ruptures. The situation of the ovum

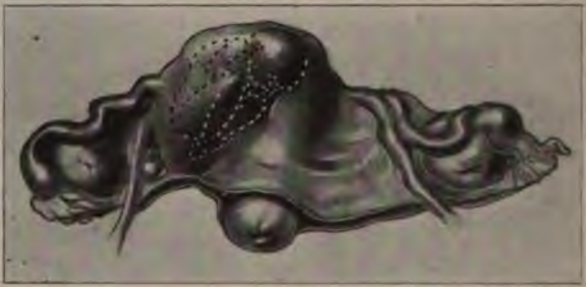

Fig. 418.—Tubo-uterine or Interstitial Pregnancy.

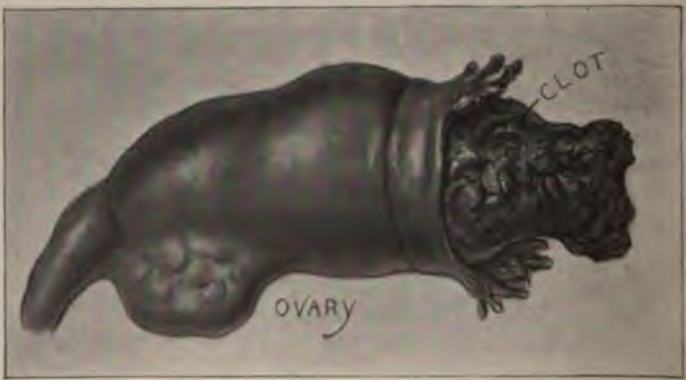

Fig. 419.—Tubal Abortion.

near the abdominal ostium favors its extension through the opening in the abdomen as a tubal abortion. *Moles* occur in tubal as in uterine gestation. They vary from one to eight centimeters in diameter, and are globular or ovoid, assuming the latter shape in the larger varieties. The tubal moles are formed by hemorrhage, which occurs into the subchorionic diameter, between the chorion and amnion. This may be gradual or sudden, and results in the death, and often in the disappearance, of the embryo. The puerperal origin of the condition, in the absence of any vestige of the fetus, is determined by the discovery with the microscope of the chorionic villi. The outer investing membrane, the chorion, is generally shaggy, with villi, which are rendered more visible by washing the clot under a gentle stream of water. Doubt may exist as to the character of the mass when the amniotic cavity is obliterated, but upon section the villi will be disclosed in clusters as small circular bodies.

Moles are formed during the first weeks of pregnancy. Examination of the mole shows that the blood collection is limited externally by the chorion, and internally by the amnion, a space which is soon obliterated by the encroachment of the amnion. The blood is derived from the fetal circulation, and differs from that of the adult by its red corpuscles being enucleated. The blood may not be the result of a single hemorrhage, but of repeated bleeding. The blood is thin and laminated in a sacculated aneurysm. Tubal moles are found immersed in blood which has been extravasated from the maternal vessels; when they have been free in the peritoneal cavity or are lodged between the folds of the broad ligament, they become yellow externally and frequently quite hard and firm. The mole must be recognized as an abortion, although it is not always extruded from the tube. The separation of the ovum, thus altered, from the tube is not infrequently a source of severe hemorrhage, which fills up the tube and may escape into the abdominal cavity and through the uterus as well.

Tubal abortion is another termination for tubal gestation, particularly when the developing embryo occupies the external third of the tube. As already noted, the ostium begins to manifest changes as early as the fourth week, which result in its closure often as early as the sixth, or at least by the eighth, week. The nearer the fecundated ovum is situated to the ostium, the greater is the danger of its extrusion; increasing in size beyond that which the tube is able to accommodate, it pushes itself out through the funnel-shaped cavity and escapes into the abdomen. Such an accident is denominated tubal abortion, and is not infrequently associated with profuse hemorrhage, a condition very similar to that which takes place in uterine abortion. The mole is discharged, with copious hemorrhage into the peritoneal cavity. Its displacement takes place during the first two months. After the ostium is occluded blood escapes only from the tube after rupture of the sac. The quantity of blood discharged is sometimes enormous, and is attended with all the symptoms of internal hemorrhage. It is one of the most frequent causes of pelvic hematocele. This condition has been ascribed to metrorrhagia, to reflux menstrual discharge from the uterus, or to hemorrhage from the Fallopian tube. The reason for its association with metrorrhagia is that while the embryo is developing in the tube a decidua is forming in the uterus. With the tubal abortion there takes place hemorrhage from the uterus as a result of the separation and expulsion of this decidua. This not infrequently happens near the time the patient expects to menstruate; hence, it is regarded as reflux menstrual fluid. In not a few cases the bloody discharge from the uterus may be derived from the gravid tube in protracted tubal abortion. If the bleeding occurs at a time not synchronous with the menstrual flow it is frequently attributed to a disorder of the uterus. In all such cases the affected tube and the bloody discharge should be carefully examined for the presence of the embryo of the chorionic villi. The abortion may be complete or incomplete: Complete, when the embryo with its envelopes is discharged; incomplete, when a portion remains attached to the tube. The latter is the more common. The danger is increased in these cases, owing to the fact that the bleeding is apt to recur, while the mole is retained. Careful microscopic examination of the extruded mass will disclose the villi, which are discovered in sections of the adherent pole of the mass.

A third termination of tubal gestation is that of rupture. As the embryo develops, the tube becomes more and more thinned, until it is no longer able to resist the inward pressure, and rupture results. Rupture of the gestation sac may be considered under: first, primary rupture; second, secondary rupture—each of which may be intraperitoneal or extraperitoneal. Primary rupture takes place at any time between the third and tenth weeks after impregnation, and is rarely deferred beyond the twelfth. Predisposing causes of rupture are the gradual thinning of the gestation sac by the growth of the ovum or the undue distention of the membrane by hemorrhage, especially at the seat of implantation of the chorionic villi. The rupture may be excited by violence, as jumping from a train, straining at stool, jarring of a carriage, vomiting, or sexual congress. Rupture may occur as a result of efforts to determine the diagnosis.

It was my misfortune to see a case of this kind in which the examination by myself, and subsequently by the attending physician, was followed within a few minutes by symptoms of profound collapse, which confirmed the suspicion that an extra-uterine pregnancy was present. As soon as permission could be secured the abdomen was opened, to find half a gallon of liquid blood within it; and although the vessel was secured, and every measure taken to restore the patient, she succumbed to the shock.

The tube is enveloped in two-thirds of its circumference by the peritoneum, which forms a mesosalpinx; as the tube is enlarged by the developing embryo the mesosalpinx separates. This condition is true only of the internal two-thirds of the tube. The external third is not supplied with the mesosalpinx. This explains the greater frequency of intraperitoneal rupture when the embryo is situated in the outer third of the tube. The intraperitoneal rupture is three times as frequent as the extraperitoneal. In primary intraperitoneal rupture the embryo and its enveloping membranes, or a mole, are discharged into the abdominal cavity, and a certain amount of hemorrhage follows. The amount of blood extravasation will depend upon the period of pregnancy when the rupture occurs; when early, it may be

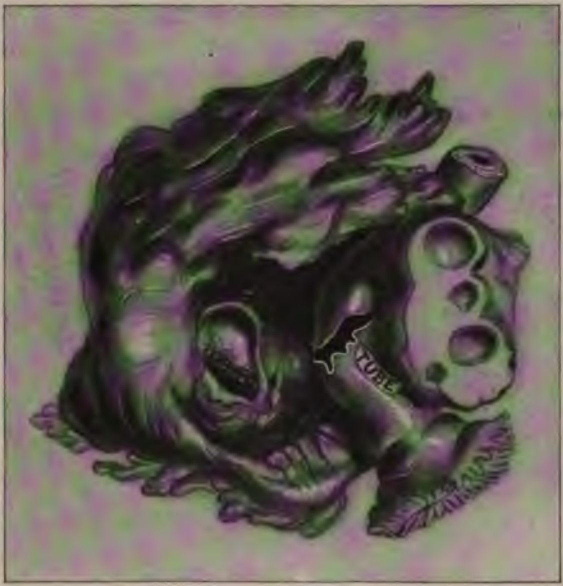

Fig. 420.—Complete Rupture of a Tubal Sac.

slight. After the first month, however, it is copious, frequently sufficient to cause death in a few hours. I saw one patient who had missed her period but five days. She was taken with violent pain at night, fainted several times, and was seen and subjected to operation the following morning. She was then extremely anemic, and the abdomen was found filled with a large quantity of blood, which had escaped from a cyst not larger than a bean in the left Fallopian tube. The ligation of the bleeding vessel and the removal of the extravasated blood resulted in her restoration to health. Frequently the hemorrhage may be so great as to cause a fatal result in a few hours; in some cases even in half an hour. When a rupture is deferred until the seventh week, the embryo or mole is not constantly discharged through the opening. The quantity of blood which escapes may be very large, and demand immediate attention, or it may be slight in character, permitting the patient to escape the immediate dangers incident to the accident with but slight shock. The effused blood can undergo absorption and recovery ensue. When the discharge is not excessive, the blood collects in the rectovaginal fossa and floats the coils of intestine, forming an intraperitoneal hematocele, as has been described. Dangers of the primary intraperitoneal rupture are: first, hemorrhage so great as to cause immediate death; second, the fatal result may be occasioned by repeated hemorrhage. In primary extraperitoneal rupture that portion of the tube not covered by peritoneum gives way and permits the discharge of the ovum and the accompanying blood between the layers of the mesosalpinx. Here the blood is forced

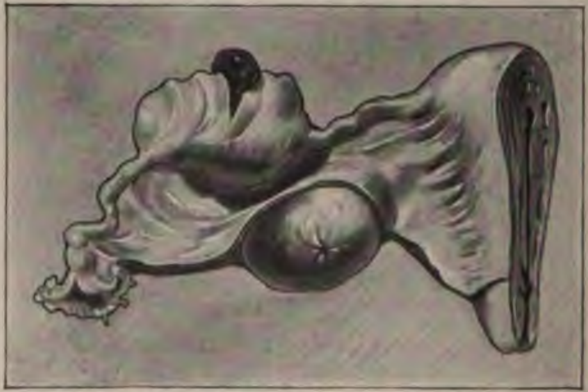

Fig. 421.—Incomplete Rupture of Gestation Sac.

into the connective tissue between the layers of the broad ligament, and, fortunately for the patient, the bleeding is checked by the pressure from the resisting tissues, and is generally arrested before it assumes dangerous proportions. This lesion rarely causes trouble. Occasionally, the rupture of the tube is slight, the embryo partly escapes, with its membranes remaining uninjured, and the pregnancy will continue. Rupture affords increased space for further development, and, the power of resistance being decreased, the ovum, as it increases in size, burrows between the layers of the broad ligament. The rupture may be gradual; the tube does not split suddenly, but as its walls, through the gradual distention, become thinned, they yield in the part uncovered by peritoneum until an opening forms and the ovum is extruded, accompanied by sudden hemorrhage. The extent of collapse and its duration will be largely dependent upon the amount of blood effused. The artificial opening gradually extends, the embryo and placenta make their way into the new area, and, unless, the hemorrhage be sufficient to terminate the life of the embryo, the pregnancy is continued. This is known as a mesometric or an intraligamentary gestation. In this anomalous development of the ovum the placenta is liable to many changes which will vitally influence the life of fetus and mother. The tubal mucous membrane plays a very insignificant part in the formation of the placenta. The latter is developed mainly from the fetal tissues, as the tube does not develop a decidua. With the fecundation of the ovum there are at once developed changes in the uterine mucosa in preparation for its retention and sustenance. When the fecundated ovum is arrested in its progress, and prevented from entering the uterus, the uterine decidua continues to develop as if it were normally placed. This decidua, however, is rarely retained until the completion of gestation, but is thrown off during the false labor; not infrequently, when the individual suffers from symptoms of tubal abortion or tubal rupture. The occurrence of this profuse bleeding after one or two months amenorrhea, with the discharge of a cast or of shreds of tissue from the uterus, which may frequently be enveloped in a large clot, lead the patient and her attendant to believe that a uterine abortion has occurred. When the individual goes to term, the uterine decidua is thrown off as a cast or in shreds, during the early months of the pregnancy. When the decidua is discharged in small fragments, it takes place without unusual pain; but *en masse*, the symptoms are similar to those of a miscarriage. The absence of the uterine decidua at the death of the ovum from rupture of the cyst, even in the early stages of pregnancy, is no proof that the membrane has not existed and been expelled before fetal death. When pregnancy occurs in one-half of a bicornate uterus, the decidua is present in the unimpregnated cornu. Under no circumstances, however, either in the normal or abnormal pregnancy, is a decidua found in the Fallopian tubes. As the destructive changes of the mucous membrane of the genital tract associated with menstruation are limited to the uterine cavity, so the true decidua is found in the same portion. It is sometimes important to avoid confounding the decidua of pregnancy with the cast thrown off from the uterus in membranous dysmenorrhea.

Rupture may be complete or incomplete. Complete rupture is one in which the ovum and its envelopes escape, either into the peritoneal cavity or into the broad ligament, with more or less profuse hemorrhage. A partial rupture may result in the gradual thinning of the wall until it gives way in one place; and when this takes place extraperitoneally, it is reinforced by plastic exudate, with the occurrence of but little, if any, hemorrhage. Successive ruptures or partial ruptures thus occur until finally the envelope becomes sufficiently distended to permit the fetus to develop as in an intra-abdominal pregnancy. At no time during such a rupture has the separation occurred between the placenta and the tube. In the extraperitoneal variety the embryo and placenta gradually occupy a sac formed by the expanded tube and separated layers of the broad ligament. The floor of this space is formed by connective tissue and levator ani muscle. The ultimate effects depend to a great extent upon the original situation of the placenta. If the embryo is situated above the placenta, the latter is depressed between the layers of the broad ligament until it is arrested by the pelvic floor. If the embryo lies below, and the membranes burrow between the layers of the broad ligament, the placenta is pushed up until it lies high in the abdomen. As there is no tubal decidua the placental villi lie embedded in the decidual cells without any intervillous system existing. When the placenta is displaced into the tissue of the broad ligament, which occurs gradually, its structure becomes seriously damaged: the villi are less perfect in their contour, points of extravasation of blood are present, and blood-crystals are abundant. Finally, under the pressure, the placenta becomes gradually reduced to a mass of compressed villi; its serotina is destroyed and is replaced by blood-crystals and by organized blood-clot. While the consequences to the placenta from its displacement into the tissue of the broad ligament are thus marked, it is not attended with nearly so much danger as when the placenta is situated above the embryo. It is then subject to extreme disorganization, forming, as it does, the roof of the gestation sac. The changes that take place in the placenta owing to the pressure of the developing fetus have a great influence on the subsequent history of the pregnancy, adding to a marked degree to the peril to the life of the mother, and are, in the majority of cases, disastrous to the life of the fetus. The constant tension to which the peritoneum covering the gestation sac is subjected leads to partial detachment of the placenta and to severe hemorrhage, either into the gestation sac or into the peritoneal cavity. In the later stages of the pregnancy such hemorrhage is almost invariably fatal. A woman with an intraligamentary pregnancy, with a placenta situated above the fetus, runs a greater risk of losing her life than she would from placenta prævia. A tubal placenta which is situated above the embryo has its structure so damaged by rupture as to render it an inefficient respiratory organ; and the constant results upon the embryo are very marked. The fetus from a tubal gestation is rarely a satisfactory individual. It is very unusual for a fetus to live longer than a few days or weeks subsequent to its delivery. Not infrequently it is ill formed, suffering with hydrocephalus, club-foot, spina bifida, ectopia of the viscera, and other deformities. When normal in shape, it is exceedingly defective in size. One case is recorded in which the tubal sac contained two embryos, measuring eleven centimeters in length, which were united by a band in the thoracic region. Dr. M. Price reports a well-formed fetus which survived operation and was subsequently healthy. The extent of hemorrhage in an incomplete rupture will depend much upon the situation of the placenta. If the placenta be attached to the peritoneal surface and rupture takes place over it, the bleeding will be excessive and will possibly result in the death of the patient, unless surgical intervention prevent. If the placenta is situated on the opposite side to that on which rupture occurs, the envelopes may protrude, but little bleeding will follow, and the sac becomes reinforced by plastic exudate and adhesions. The sac wall is then formed by the uterus, the bladder, the parietal or pelvic peritoneum, and the coils of intestine.

Secondary Rupture.—The extraperitoneal rupture causes the formation of a secondary broad ligament gestation sac, which increases in size and may subsequently undergo rupture. As has already been indicated, the danger is much increased when the placenta is situated above the fetus. As the pregnancy progresses the peritoneum becomes stretched and is separated from the adjacent parts and from the viscera. The sac extends into the abdomen, and strips the peritoneum from the anterior abdominal wall to a greater degree than would an overdistended bladder. When the posterior peritoneum is thus raised up, the rectum, as well as the posterior surface of the uterus, may be deprived of serous investment. The placenta is insinutated between these parts, and secondary rupture may result at any time between the twelfth week and the completion of term. The effects of this secondary rupture are dependent upon the injury to which the placenta is subjected. After the middle period of pregnancy has passed, when it involves the placenta,—as it almost certainly will, situated, as the latter is, above the fetus,—most frightful hemorrhage and rapid death is the consequence. Earlier in the course of the pregnancy the hemorrhage is not so severe, and may be arrested by prompt surgical intervention. Opening of the sac into the peritoneal cavity is recognized as secondary intraperitoneal rupture. If the fetus occupies the upper portion of the sac and the placenta is attached below, the former may escape among the intestines. Secondary rupture does not always occur. The patient may go to term, spurious labor follow, the liquor amnii be absorbed, and the placenta disappear. If the extra-uterine pregnancy has not been suspected and its course not disturbed, the formation of a mummified fetus, or lithopedion, results, which may be discovered years later. Secondary intraperitoneal rupture may occur at any time between the twelfth week and term. When it occurs at or near term, the belief is perpetuated that the fertilized ovum had tumbled into the peritoneal cavity, to ingraft itself upon the serous membrane and there develop. It should be understood, however, that there is no primary peritoneal pregnancy but that the condition originally developed in the Fallopian tube. When the pregnancy develops in the uterine end of the tube, particularly that portion which traverses the uterine wall, it is termed a tubo-uterine pregnancy. This form of pregnancy is not frequent, and can readily be confounded with pregnancy in one cornu of a bicornate uterus. The tubo-uterine gestation differs in its course, relations, and mode of termination from the purely tubal form. Primary rupture generally occurs before the eighth week, and the pregnancy is rarely continued without rupture beyond the twelfth week. The tubo-uterine gestation sac may rupture in two directions: into the peritoneal cavity, causing frightful hemorrhage and a rapidly fatal result, or, want of resistance being slighter toward the uterine cavity, the fetus and envelopes may be pushed into the uterus and terminate as in an intra-uterine conception. The intraperitoneal rupture is much more rapidly fatal than in the tubal form, and causes more severe hemorrhage, because the uterine wall is more vascular and the sac is situated in closer apposition to larger vessels. Tubal and tubo-uterine pregnancy have the following distinctive characteristics: the tubal pregnancy is very common, the tubo-uterine rare; the tubal gestation sac is very thin, the tubo-uterine very thick.

The termination can be: (*a*) Intraperitoneal rupture for each, or (*b*) rupture into the intraligamentary space. In the tubo-uterine rupture can occur into the uterine cavity, with the discharge of the fetus through the vagina. (*c*) In the tubal abortion can result, and, as in the primary rupture, date from the third to the twelfth week. In the tubo-uterine rupture occurs at any time from the fifth to the twentieth week. Ovarian pregnancy pure and simple is extremely rare, although there are cases in which careful examination has disclosed ovarian structure in the sac wall, while the tube is free and unaffected. The majority of cases of ovarian pregnancy, however, are tubo-ovarian, in which the embryo has developed in the orifice of the tube and been partly extruded without loss of its vitality. As would be readily inferred, the life of the embryo in a tubal pregnancy is necessarily precarious. After rupture the pregnancy may continue until full term. Symptoms of labor set in, during which the gestation sac may burst into the peritoneal cavity, or, if this catastrophe is avoided, the fetus dies. The body remains quiescent or produces various forms of disturbance. Thus, the liquor amnii is absorbed; the tissues of the fetus become mummified or partly calcified, and form a lithopedion. The softer parts are converted into adipocere or undergo other forms of decomposition. The placental tissue is gradually absorbed and disappears.

Mummification.—The process of mummification is attended with absorption of the fluids, while the soft parts are converted into a dried tissue similar to that which follows when a dead cat is permitted to remain under an old building, producing a dried cat. An extra-uterine fetus can be retained in the body for a longer period of time. Cheston reports a lithopedion carried for fifty-two years; Barnes, one forty-two. The possibility of the fetus being carried this length of time does not necessarily indicate that it can not prove a source of danger to the patient. Pathogenic micro-organisms can find entrance to the sac through the adjacent hollow viscera, and at any time produce serious trouble. Suppuration follows, and pus finds its way through the abdominal wall, and penetrates the vagina, uterus, bladder, or rectum. Through any of these openings fragments of fetal tissue from time to time escape, causing frightful distress and necessitating operation for relief. The existence of a lithopedion or macerated fetal skeleton does not preclude subsequent pregnancy. One case came under my observation in which a woman with a good-sized and distinctly well-defined lithopedion subsequently gave birth to two children.

470. Symptoms.—The symptoms of an ectopic gestation are dependent upon the duration and course of the pregnancy. Prior to rupture the symptoms are rarely such as to cause the patient disturbance or to lead her to suspect the pregnancy to be otherwise than normal. The usual history is that the patient has missed a menstrual period, has had symptoms indicating the existence of pregnancy, or has manifested the ordinary signs of pregnancy incident to the period, with possibly increased discomfort on one side of the pelvis and occasional attacks of pain and distress, when suddenly there is an attack of pain so severe and lancinating in character as to cause the patient to lose consciousness. In severe cases the patient falls back unconscious, and is covered at once with a cold, clammy perspiration; presents symptoms of most profound anemia and a sighing or gasping respiration; when conscious, complains of intense pain in the lower abdomen and pelvis; has a frequent, feeble, scarcely perceptible pulse and dilated pupils; complains of loss of sight—everything dark about her; attacks of syncope recur; and unless the condition is promptly recognized and intervention practised, death follows. Occasionally, the symptoms are not so marked; the patient is weak, debilitated, shows symptoms of shock or collapse, soon rallies, with recurring attacks of a similar character, which indicate that the hemorrhage again recurs. In other cases the progress of the case is insidious; a small aperture has occurred, the walls have been stretched, and the pregnancy may progress without further accident. The tube may have ruptured intraperitoneally or extraperitoneally. The symptoms of the two varieties are entirely different, and the gravity of the symptoms of the intraperitoneal variety will depend upon whether the rupture has been complete or incomplete, and also upon the situation of the placenta. When the rupture occurs over the placenta, even though incomplete, hemorrhage can be so severe as to cause the death of the patient if intervention is not instituted. If the patient survives the hemorrhage and shock, the accident is followed by more or less tenderness over the abdomen and by abdominal distention, which are indications of localized peritonitis. The sac becomes encysted, and intraperitoneal hematocele follows. In the extraperitoneal variety the symptoms are not nearly so marked; the indications of collapse are slighter, the patient rallies more quickly, and the resistance of the tissues limits the amount of bleeding. The distressing symptoms are often so slight as scarcely to lead the patient to apply for examination; and when examination is made, it is more likely to be with the purpose of determining the existence of pregnancy than the occurrence of an abnormal location for the embryo. With the occurrence of symptoms of rupture there is not infrequently a discharge of blood from the vagina, which is generally associated with uterine pain. The uterine pain or the pain arising from rupture may cause the individual to believe that an abortion is about to occur. This suspicion is still further confirmed by the discharge of a cast of the uterus or of shreds of tissue associated with clots, which may deceive both the patient and her attendant into the belief that an abortion has occurred. When the hemorrhage is slight and the ovum retains its connection with the tube, the fetus may go on to full development, and may reach full term. The pregnancy, especially when it is situated posterior to the uterus, may reach full term without leading the patient to the suspicion that an abnormal condition exists, and it is only after the beginning of labor, when an examination is made, that the true state of affairs is recognized. Even then it is not always recognized, and the spurious labor may terminate without the discharge of the fetus and the sac may undergo subsequent changes.

471. Diagnosis.—Diagnosis comprises, first, the determination of extra-uterine pregnancy prior to rupture; second, the determination of rupture with intraperitoneal or extraperitoneal hemorrhage and with death of the fetus; third, secondary rupture; fourth, peritonitis; fifth, suppuration.

It is very rare that the symptoms are so marked prior to rupture as to lead the patient to seek a physical examination. The patient is generally subjected to examination to ascertain the existence of a supposed normal pregnancy. The distressing symptoms are rarely sufficiently marked prior to rupture to demand a physical examination. When, for any reason, such an examination is made in a woman who presents a history of comparative freedom from inflammatory trouble, absence of any symptoms of recent inflammatory attack, and a history of cessation of one or more menstrual periods, and physical examination discloses a mass situated upon both sides of the pelvis, which is slightly movable, more globular than is characteristic of a tubal tumor, and yet involves the tube to such a degree as to form a part of the broad ligament, while the uterus is but slightly enlarged, the cervix is somewhat softened, and the vagina and pelvic floor are turgid with blood, not infrequently pulsating on the side of the tumor—under these circumstances an ectopic gestation should be recognized. In one case under my observation this pulsation was even more distinct than if from the radial artery.

Second, *rupture*.—The determination of rupture of an ectopic gestation may be suspected when the patient offers a history of having failed to see her sickness for one or two periods; with the ordinary symptoms of pregnancy there has been associated more or less discomfort on one side; a sudden attack of violent, tearing pain, followed by syncope; symptoms of internal hemorrhage; and a state of collapse. A physical examination affords but little information, as, unless the tumor is sufficiently large to cause a sensation of resistance upon one side, the physical signs are indefinite. When the bleeding is extensive and the abdominal walls are not very resistant, a sensation of distention may be noticed, and even fluctuation may be recognized. If the hemorrhage is not so profound as to endanger life, the watery portions are gradually absorbed, become clotted and more resistant, and a mass can be felt in the pelvis, which, in the absence of the previous history of recent inflammatory trouble or previous existence of a growth, can be considered as effused or clotted blood. In such cases the accumulation is generally retro-uterine. When the extravasation is large, it may fill up the pelvis, push the uterus forward, and raise the intestines above it; in other cases, with the uterus in a state of retroversion, the mass can be situated in front, and form an ante-uterine hematocele; or, in very large accumulations, the uterus may protrude through it, producing what is known as a circumuterine hematocele. In extraperitoneal hemorrhage the symptoms are much less acute. The indications of shock or collapse are less marked, although the symptoms of internal hemorrhage are present to a limited degree. Examination will disclose that one side of the pelvis may be filled and the broad ligament distended. The tumor may be quite tense, the uterus pushed to the opposite side, and the mass situated upon one side only. The condition differs from tubal disease in that the broad ligament is filled by it, there has been an absence of previous inflammatory trouble, and the patient does not present the characteristic symptoms of inflammation. In the intraperitoneal variety the irritation of the accumulation of blood causes certain reactive symptoms and the development of peritonitis. The temperature is elevated, the pulse is rapid, and the abdomen is tender and is sensitive to pressure, but the symptoms are not so acute and severe as in marked inflammation. The characteristic symptom is that of discharge from the uterus of the decidual membrane, which may be a complete cast of the organ, and may show the orifices of the Fallopian tubes and the internal os, or it may be a partial cast, or may be thrown off in shreds, associated with large quantities of clot. Inquiry should be made with regard to this symptom, and, when possible, investigation of the discharged tissue should be made. It is important to differentiate it from the decidua thrown off as a consequence of dysmenorrhea. In that of pregnancy the decidua is from six to eight millimeters in thickness, and is marked by decidual cells, while the menstrual decidua rarely exceeds two or three centimeters in length, and is scarcely two millimeters in thickness, is translucent, and is rarely passed entire. When the symptoms have been slight and the woman has regarded herself as the victim of an abortion, it is not until the enlarged fetal sac causes a suspicion of continuation of pregnancy that the patient will come under observation, and even then she may not consult the physician.

Later, as the sac increases in size, from pressure of the developing embryo upon the placenta situated above it, we may have a secondary rupture, resulting in extensive hemorrhage, rapid collapse, and early death, unless surgical intervention is at once practised. In all these cases examination must be made with the greatest precaution in order to prevent rupture of the thin-walled sac. It should be sufficient to determine that the uterus is but slightly enlarged, in close apposition to the sac, possibly lying against it on one side or pushed to one side of it, and in the later progress the parts of the fetus may be recognized more readily and with greater distinctness than if situated within the uterine cavity. The recognition of the fetal heart-sounds is, of course, an absolute indication of the existence of pregnancy. Upon the completion of the term, the occurrence of spurious labor, and cessation of fetal movements, changes occur which, coming under observation some months later, may increase the obscurity of the condition.

A patient came under my observation who supposed herself pregnant, and who suffered from a bloody discharge, with considerable pain, at the end of the second month, which led her to think that an abortion had occurred. The supposed abortion occurred in February. Her abdomen consequently became enlarged, and in the following October she went into labor. Pains continued for two days, and after the movements ceased her menstrual periods returned. In April, when she came under my observation, she presented a tumor as large as in a pregnancy at full term, over which there was distinct fluctuation and marked resonance. A thin-walled sac was recognized, but there was no sign of a resistant mass. Vaginal examination disclosed behind the uterus a tumor which filled Douglas' pouch. The uterus was enlarged and was situated directly in front of the tumor. On percussion, there was resonance everywhere. No dullness could be distinguished, although fluctuation was distinct. The diagnosis was an ectopic gestation, with death of the fetus, decomposition in the fetal sac, and the formation of gas. This diagnosis was confirmed by opening the abdomen and finding posterior to the uterus a sac which contained a macerated fetus and a considerable quantity of offensive fluid.

472. Differential Diagnosis.—Tubal and uterine pregnancy may coexist. Uterine pregnancy may follow tubal, or repeated uterine pregnancies may occur subsequent to the formation of a lithopedion. Tubal pregnancy may be bilateral. Its frequent occurrence in the remaining tube after removal of a tubal gestation sac has led some operators to advocate the removal of both appendages in every case of tubal gestation. Tubal pregnancy may coexist with ovarian and tubo-ovarian tumors. In a case I saw with Dr. J. M. Fisher the symptoms justified his diagnosis of rupture of a tubal gestation sac. From its outline a mass upon the left side of the pelvis was considered to be a large extraperitoneal hematocele, which I decided to evacuate by a vaginal incision. A large quantity of clotted blood was evacuated, above which was a smooth cyst, too large to remove through the vagina, and a ruptured tubal gestation sac upon the opposite

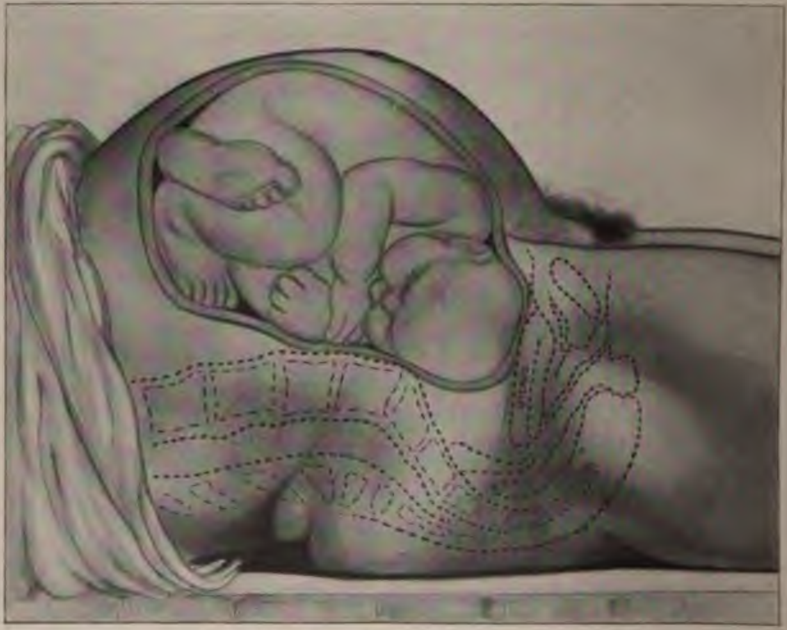

Fig. 422.—Large Ectopic Gestation Sac.

side. The removal of the cyst was completed by abdominal incision.

The following conditions may be confounded with ectopic gestation: first, uterine pregnancy; second, pregnancy in a bicornate uterus; third, a retroflexed gravid uterus; fourth, spurious pregnancy; fifth, ovarian tumors; sixth, uterine tumors; seventh, intraligamentary tumors; eighth, accumulation of feces in the rectum.

First, uncomplicated uterine pregnancy is generally easily recognized by the change in the shape and size of the organ. In ectopic gestation the jug-like shape or outline of the organ is wanting. A sac or mass, rather sharply defined, will be found over one tube, if rupture has not yet occurred, and the subjacent vessels pulsate more distinctly than upon the opposite side; after rupture, the previous history of more or less severe shock, profound anemia, and the appearance of an enlarged mass in the pelvis without previous inflammatory phenomena. The introduction of a sound and the use of the curet to secure decidual tissue have been advocated, but are procedures not free from danger. In possible uterine pregnancy an abortion, with danger of infection, must not be overlooked. The investigation for decidua may be misleading, as it may have been previously exfoliated, and the procedure endangers the development of septic processes to complicate the existence of tubal gestation.

Second, pregnancy in one horn of a bicornate uterus may be impossible to differentiate from a tubo-uterine or an interstitial pregnancy. Fortunately, the treatment of the two conditions is similar, and is almost equally urgent. A tubal gestation is situated at a greater distance from the uterus.

Third, the retroflexed pregnant uterus is recognized by palpation, in which we are able to trace the tumor back from the cervix, and the smoothly outlined fundus is capable of considerable movement.

Fourth, careful analysis of the symptoms, associated with the accurate consideration of physical signs, will guide to a correct diagnosis. It is a grave error to mistake, after the abdomen has been opened, an extraperitoneal pregnancy for sarcoma or myoma.

Fifth, ovarian tumors are usually differentiated by their history. It is only when one of these growths has produced no symptoms by which its presence could be suspected, and is suddenly complicated by an acute attack, during which or subsequent to which examination discloses its presence more or less fixed in the pelvis, that error is possible. Such a train of symptoms is readily produced by twisting of the pedicle of a small ovarian or a broad ligament cyst. A young unmarried woman came under my observation who had a severe attack of pain upon the right side, which was pronounced appendicitis. While a mass could be felt above the brim of the pelvis, it was movable, and there was no indication of inflammatory exudation. Notwithstanding the good character of the individual, ectopic gestation was considered a possibility; an abdominal incision disclosed a broad ligament cyst beyond the ovary, closely attached to the outer part of the tube, whose pedicle had twisted, causing hemorrhage into the cyst and twisted portion of the tube, with a large quantity of bloody serum free in the peritoneal cavity.

Sixth, when, in an extra-uterine pregnancy, the fetus is dead, the fluid portions have been absorbed, and the mass is hard and firm, with its sac closely adherent to the side of the uterus, the physical signs are insufficient to establish the differential diagnosis between it and an intraligamentous myoma.

Seventh, intraligamentary tumors are easily confounded with ectopic gestation. Frequently the diagnosis can be determined only after abdominal incision. A patient was brought to me with the following history: She had been married nine years and had never been pregnant; six weeks before admission she was seized with severe pain in the left side, and subsequent inflammatory symptoms, which confined her to bed the greater portion of the time. A mass, quite resistant, was felt to the left and in front of the uterus, which was firmly fixed by adhesions. The long period of sterility, sudden onset, and more or less fixed tumor, not previously recognized, led me to suspect tubal gestation, with intraligamentary rupture. The incision, however, disclosed an intraligamentary ovarian cyst with thick walls, which had undergone a degenerative process, which probably explained the sudden onset.

Not infrequently the diagnosis can be determined only by incision, and an ectopic gestation is found when operations are performed for other conditions, and the reverse.

Eighth, careful examination should exclude fecal accumulation; ordinarily, the latter condition is determined by the possibility of indenting the fecal masses. When there is any doubt, an expression of opinion should be withheld until a complete evacuation of the bowels can be secured through the use of an active purgative, supplemented by free rectal enemata.

The differential diagnosis of tubal rupture is often difficult. Rupture is simulated by lesions of the abdominal viscera, such as perforating ulcers in the stomach, duodenum, small intestine, and vermiform appendix; rupture of a pyosalpinx; torsion of the pedicle of a small ovarian cyst; acute intestinal obstruction; renal and biliary colic. A case of tubal gestation has been brought to operation as a supposed strangulated hernia.

The following table, as modified by Gregg Smith from Webster, presents in a convenient form a summary of the pathologic and clinical features of ectopic gestation:

- A. AMPULLAR.—Gestation beginning in the ampulla of the tube.
  - I. *Persisting* (rarely goes to full term).
  - II. *Rupture* (the usual result):
    - 1. Into broad ligament:
      - (*a*) Gestation continues there.
      - (*b*) Secondary rupture into peritoneal cavity.
      - (*c*) Gestation terminates:
        - (*a′*) By formation of hematoma.
        - (*b′*) By suppuration.
        - (*c′*) By mummification.
    - 2. Into peritoneal cavity:
      - (*a*) Gestation continues, the placenta remaining in the tube, the fetus and the membranes being in the cavity.
      - (*b*) Gestation terminates:
        - (*a′*) The patient dying from hemorrhage or shock.
        - (*b′*) By absorption of the mass.
        - (*c′*) By mummification or by adipocere or lithopedion formation.
  - III. *Destruction of gestation:*
    - 1. By tubal abortion.
    - 2. By formation of mole.
    - 3. By hematosalpinx.
    - 4. By suppuration.
    - 5. By absorption after early death.
- B. INTERSTITIAL, when the gestation develops in the interstitial portion of the tube:
  - I. *Persisting* (the gestation may go on to term).
  - II. *Rupture:*
    - 1. Into the peritoneal cavity.
    - 2. Into the uterine cavity.
    - 3. Into both the peritoneal and uterine cavities.
    - 4. Between layers of broad ligament.
  - III. *Destruction of gestation and regressive changes in fetus and envelopes.*
- C. INFUNDIBULAR, when the gestation is in the outer end of the tube. The ovary may form part of the wall of the sac.

473. **Prognosis.**—Extra-uterine pregnancy at any stage of its progress must be regarded as a condition pregnant with the greatest peril to the individual. It should be regarded as just as positive an indication for treatment as would be the presence of malignant disease. If discovered before the rupture of the sac, the patient is in danger from hemorrhage. The longer the condition progresses, the more grave is the peril. After rupture, with death of the fetus, the patient is not free from danger, as the collection of blood—the hematocele—may become infected, from its proximity to the hollow viscera, and cause the formation of an abscess or the development of pyemic symptoms. If the fetus survives the rupture, its subsequent development only increases the danger. A secondary rupture, with escape of the sac contents into the peritoneal cavity, or the frightful hemor-

rhages which result in some conditions, may prove immediately fatal. The woman goes on to full term; the fetus dies, then undergoes retrogressive processes, which may at any time, even after years of quiescence, become infected, resulting in the formation of abscesses, perforation of viscera, and escape of the contents of the sac. As the nutrition of the fetus in the majority of cases is defective, from unfavorable implantation of the placenta, frequently from pressure upon it, the fetus is generally imperfectly developed, often undersized, suffering from hydrocephalus, spina bifida, club-foot, and other deformities. The preservation of the life of such an individual should not be considered when it is recognized that the life of the mother is constantly in peril. Furthermore, the fact that, even under the most favorable circumstances, the chances for the fetus are very greatly decreased, and that, even when delivered alive, its duration of life is short, should be taken into account.

474. **Treatment.**—In a condition fraught with such dangers as that of ectopic gestation it does not seem the province of the physician to practise any other method than one which will afford the greatest certainty of relief and which can be accomplished with the least danger. This, in our judgment, is through surgical manipulation; but, as other methods of treatment have been advocated, before entering upon the consideration of extirpation we will consider the substitutes. The substitute methods recognized are evacuation of the liquor amnii, injection of poisonous substances, elytrotomy, and the application of the electric current.

The evacuation of the liquor amnii was advocated by Simpson in 1864. He treated a case by puncturing the cyst through the vagina without killing the child, and the mother died in three days. Braxton Hicks tried a similar method in 1865, which killed the child, but the mother died of hemorrhage. Greenhalgh, in 1867, had a successful case. James, of Philadelphia, in 1867, had a successful case after much tribulation. This plan of treatment, owing to the great mortality, has been generally abandoned.

The injection of poisonous materials into the fetus and its enveloping fluids was advocated by Joulin in 1863. Morphin is the drug most frequently used. Other remedies, such as strychnin and ergotin, have been similarly employed. Inunctions of mercury and iodid of potash and repeated bleeding have been advocated, but it is difficult to explain why. The injection of morphin with a hypodermic syringe is practised before the fifth month. Two injections are usually given, containing $\frac{1}{4}$ of a grain each, at an interval of from eight to fifteen days. The treatment may result in severe hemorrhage, septicemia, and perforation of an intestinal loop, so that, while apparently a simple procedure, it is attended with greater danger than an abdominal operation.

Elytrotomy, or the removal of the fetus and its contents through a vaginal incision, was instituted as early as 1817 by Dr. King, of Georgia. This operation, which has been lately revived, is not by any means a new one. In the discussion of hematocele vaginal incision has been advocated as a justifiable method of procedure when the condition has become chronic; in other words, some time after the hemorrhage has taken place, when the vessels are occluded and the fetus is more than likely to be dead. In such cases vaginal incision affords an opportunity for clearing away the debris without subjecting the patient to so serious an operation as would be that through the abdominal wall. But before rupture, or immediately following rupture, in order to arrest the hemorrhage, the abdominal incision should be preferred. If the patient has reached full term, the death of the fetus has occurred, but as yet without suppuration. We may choose the vaginal procedure, first, when the fetus presents with head, breech, or feet, so that it can be extracted without altering its position; second, when it is certain, from the thinness of the structures separating the presenting part from the vaginal canal, that the placenta is not situated over this part of the sac, and we are not absolutely certain that the placenta may not be inserted on the anterior abdominal wall. If it is necessary to turn the child in order to deliver it, the vaginal procedure should not be considered. Robertson advocates dividing the perineum, septum of the vagina, and rectum.

The application of electricity for the destruction of the fetus has been practised since 1853. There is a difference of opinion, however, among electrotherapeutists as to the greater value of the faradic and galvanic currents, each having its advocates. This procedure is preferable to all those which have been named, but is advisable only in the earlier months of pregnancy. In the early stages we must take into consideration the fact that the diagnosis is not always certain. Without doubt, many of the cases reported to have been cured by electricity were cases which had undergone rupture, and in which the tubal mole or embryo had escaped and lost its vitality, and the electric treatment has possibly served to expedite the absorption of the exudation—an absorption which would have taken place had electricity not been applied. Many cases in which electricity has been applied were undoubtedly cases of mistaken diagnosis. It is true that a very careful examination will differentiate the condition, but the violence required to accomplish this would greatly endanger the rupture of the fetal sac. The application of electricity, indeed, has been found in some cases to intensify the contraction of the muscle-fiber of the tube and to result in rupture and severe hemorrhage. When the death of the fetus occurs, the danger does not cease, and we will find the placenta continuing to grow, or there can be rupture with severe hemorrhage or with septicemia. In the application of the current one pole of the battery, generally the negative, is applied in the rectum or in the vagina in the neighborhood of the ovum. The other pole or a large electrode is applied to the abdominal wall an inch or more above Poupart's ligament, directly over the sac. The current is used for from five to ten minutes, increasing it according to the sensitiveness of the patient, and the application should be repeated if necessary. The practice of this procedure is of doubtful utility, and, as has been already mentioned, is not without danger. It temporizes with a condition which menaces life, and it may excite severe tubal contractions, which often result in rupture and hemorrhage.

In the consideration of operative treatment its risks and difficulties will depend to a great degree upon the stage of the gestation. Sutton says the operative treatment consists in four stages: First, before primary rupture or abortion. Second, at the time of primary rupture. Third, subsequent to rupture. Fourth, when the embryo and placenta occupy the broad ligament, and this (*a*) at or near term, the child being alive; (*b*) at or near term, the child being dead, mummified, or reduced to a lithopedion; (*c*) after decomposition of the fetus and suppuration in the sac.

Cases in which opportunity is afforded to operate prior to the rupture of the sac are infrequent, as in the majority of cases rupture takes place prior to the tenth week, and the conditions are not such as to lead the individual to feel the necessity for the examination or to consult a physician; consequently the possibility of ectopic gestation is overlooked until the danger-signal of rupture occurs. When the conditions are such as to render it probable that an ectopic gestation exists, and that rupture has not occurred, the plan of procedure should be to resort at once to abdominal operation, with ligation of the pedicle and removal of the sac. The most frequent indication for operation would be the primary rupture, and the object of the operation here is to check hemorrhage. With it, of course, is associated removal of the extravasated blood from the abdominal cavity, extraction of the ovum, and removal of the gestation sac. This operation is performed while the patient is suffering from an acute anemia, possibly in profound collapse. As soon as the abdomen is opened there will generally be a gush of blood ; the pelvis will be found more or less filled with blood-clot. We do not stop to turn out the clots, but pass the finger through the clotted blood to the fundus of the uterus and along either tube to discover the sac, which, discovered, should be at once secured in order to prevent further hemorrhage. The site of the gestation will be recognized as a soft, boggy enlargement, of varying size and consistence, according to whether the ovum is *in situ* or not. This is brought up and examined for the rent; if there is much bleeding, its pedicle is at once secured with pedicle forceps until the cavity can be cleansed or ligatures applied. After the application of the ligature the sac is cut away. This procedure is preferable to any attempt to close the sac rent. In the majority of cases, in these earlier ruptures, when it will be found that the entire ovum with its envelope has escaped, and that the patient is very much shocked, but little time should be spent in the toilet of the abdomen, beyond washing it out with a normal salt solution, to carry away the principal clots. Let the bloody fluid remain ; it is readily absorbed by the peritoneum, and serves to sustain the patient and to make up for the loss. Time should not be taken to clean the cavity by sponging, as is frequently recommended. Subsequent to rupture we will be governed in our operation by the condition. If the rupture has been into the broad ligament, with the formation of an extraperitoneal hematocele, it may be sufficient to treat the patient expectantly, to watch her progress, and to trust to nature to absorb the exudation. When the condition has existed for a considerable time, and the blood-clot is intraperitoneal and is situated in the pelvis and about the uterus, the patient may recover without operation. The watery portions of the blood absorbed, the clot becomes more firmly fixed, and becomes encysted within the pelvis ; later, it is partly organized, and ultimately the greater portion of it is absorbed. The convalescence, however, is slow, and it would seem a saving of nature's forces to evacuate the accumulated blood. The evacuation relieves the patient from the danger of its infection from the neighboring hollow viscera and the development of suppuration. The vaginal incision is the superior method of procedure, because it affords free vent for the evacuation of the accumulation after hemorrhage has ceased and is no longer a factor ; it does not interfere with the barriers that nature has erected to protect the peritoneal cavity and it enables the patient to recover from a serious condition by a rapid convalescence. The incision should not be a mere puncture, but as free as the vagina will permit. The clots should, as far as possible, be removed with the finger, and the cavity should be irrigated with a normal salt solution. Iodoform gauze should be passed through the vaginal incision to serve as a drain.

Fourth, rupture into the broad ligament, with the formation of hematocele, rarely requires operative interference. It is only in the few cases in which the embryo survives the accident and continues to grow that an operation is required. If this operation is done prior to the fourth month, the embryo, tube, ovary, and adjacent portion of the broad ligament, together with the placenta, can be removed. After the fourth month, however, the placenta may be too large to be dealt with in so summary a manner, as it may then encroach upon the peritoneum or adjacent organs. In the latter half of the pregnancy we have to consider operative measures for tubal gestation under two groups: first, the treatment of the sac; second, the method of disposition of the placenta. Some operators question the advisability of operation, while the child is alive, between the fourth month and full term. The method of procedure would be the same from the fourth to the ninth month; the results for the mother are very different. It is only when the symptoms are so urgent for the health of the mother that a primary operation should be advocated. The sac is made up of remnants of the expanded tube, or of the broad ligament, thickened and in parts expanded; in other places, of coils of intestine or of the adherent omentum. The removal of the sac, consequently, is fraught with danger, not only to the adjacent large blood-vessels, but to the viscera and ureters. The preferable plan would be to incise the sac, remove the fetus, and stitch the edges of the former to the abdominal wound. When the pregnancy is well advanced, we may be able to push the peritoneum from the anterior abdominal wall and to penetrate the sac without opening the peritoneal cavity, but the chief difficulty will be to determine how we shall manage the placenta. The method employed will entirely depend upon the situation of the placenta. Its management is most promising when the placenta is situated in the pelvis below the fetus. When above the fetus, the placenta may be incised, which will result in furious bleeding, under which the patient may succumb. Even prompt seizure and ligation of the pedicle on the uterine side of the sac may fail to arrest bleeding. The abdominal aorta must be compressed, the cavity packed with sponges, and an application made of perchlorid or persulphate of iron. Because of the danger of bleeding, surgeons frequently leave the placenta and allow it to slough away, taking measures for the external drainage. When it can be accomplished without great risk, the placenta should be removed. The technic of operating, then, is to make the abdominal incision, as in ovariotomy, in the median line; open the fetal sac with the bistoury, and exercise the precaution, first, to avoid injury to the placenta; second, to prevent discharge of the amniotic contents into the peritoneum; third, extract the fetus by seizing with the hands that part which presents at the opening of the cyst. The cord is seized with two pairs of hemostat forceps and cut between them, and the child confided to a second person. The operation is terminated in one of three different ways: (*a*) Extirpation of the entire sac; (*b*) removal of the placenta without the sac; (*c*) the retention of the placenta and sac.

(*a*) When it can be accomplished, the entire sac should be removed. The operation is more complete and the convalescence insured, with less danger of unfortunate sequels. It is accomplished whenever we can constitute a pedicle and the sac wall is made up of tissue that can, without disadvantage, be removed. The pedicle can be narrow or broad, as in the pedicle of an ovarian cyst.

(*b*) The extirpation of the placenta, leaving the sac. The placenta should be removed whenever it can be peeled out without hemorrhage; or when it is evident, the latter can be tamponed by iodoform gauze. After the removal of the placenta the gauze may be removed and replaced by a large drain.

(*c*) The retention of the placenta and sac. When the placenta is firmly attached, or it is evident that its detachment would result in a dangerous hemorrhage, it should not be disturbed. One of the following methods can then be practised:

The sac is fixed to the abdominal wall and the cavity drained, or the sac is tied off from the placenta and the entire mass returned to the peritoneal cavity, which is closed. The latter method of procedure may succeed when we have been able to secure absolute and rigorous antisepsis. The presence of a single microbe can lead to putrefaction of the placenta and suppuration. The disadvantages of the retention of the placenta are that its separation and discharge are tedious, and present continuous risks of septicemia and peritonitis. Fecal fistulæ may form. These risks are decreased by irrigation of the sac, by tying the cord close to the placenta, without disturbing the latter, by carefully sponging the cavity, and then, as has been suggested, by hermetically closing it. Even though we are able to exclude the germs from this cavity, there is danger of their entrance through adhesions to the intestines. Intestinal micro-organisms may gain access to the placenta and produce decomposition.

Sutton formulates the following rules: first, when the placenta is situated above the fetus, attempt its removal; second, if the placenta becomes detached in the course of the operation, no choice is left but its removal; third, the placenta below the fetus can be left; fourth, if the placenta is left, the sac closed, and symptoms of suppuration occur, the wound must be at once laid open and the placenta removed; fifth, if the fetus die before the operation is attempted, the placenta can be removed without risk. The growth of the placenta after the death of the fetus is very improbable. It does not decompose, but quietly and completely atrophies. When the fetus has undergone such a change as to become a lithopedion, the placenta is found to be entirely absent. The presence of a quick placenta between the fifth and ninth months of gestation renders the operation the most dangerous in the whole realm of surgery. It is sometimes advocated that after primary rupture, when it is evident that the child is continuing to develop, operative interference should be deferred until after the seventh month, unless urgent symptoms develop, in order to afford the child a chance for its life. This practice and teaching are unwise; first, because extra-uterine children, as a rule, are puny, ill developed, and the majority malformed; second, when the fetus survives extraction, it usually lives but a few weeks, or at most months; third, to save the life of a defective child the more valuable life of the mother is frequently sacrificed. If the intestine is adherent to the sac at a point at which the opening should be made, it must be separated with great care and delicacy. This is best accomplished by peeling it off with sponges. When a cutting instrument is required, it is better to borrow the tissue from the sac than to injure the intestine. We may cut out the adherent portion of the sac and leave it attached to the bowel, using the opening so made for the delivery of the fetus. The proper procedure in these cases should be to avoid the placenta, but its attachment sometimes is exceedingly obscure. Ordinarily, the signs of abundant vascularization, and frequently intimate adhesions, indicate the placental site. When it can not be avoided, it must be cut through, but its edges should be grasped with large T-shaped compressing forceps. The hemorrhage may be controlled by passing a chain suture around the opening, which included both placenta and sac, and the ends of this suture are pulled tight, to form a puckering of the gap to any desired extent, when its edges may be fixed in the wound. Fluid in the sac may be emptied by aspiration or tapping prior to the operation. Ordinarily, the sac is incised in the same direction as that of the abdominal wall, unless the situation of the placenta is such as to render incision in another direction preferable. After extraction of the fetus the edges of the sac are carefully sutured to the skin at the lower angle of the wound, leaving an opening large enough to admit the passage of a large drainage-tube alongside of the umbilical cord. The remaining portion of the abdominal incision is then closed. During the entire progress of the operation the abdominal cavity has been closed, or else protected by sponge packing. When the ovum has developed in the broad ligament, the whole pelvic peritoneum is elevated, thickened, and vascular. Instead of a thin fibrous tissue with a few vascular trunks, we have to deal with a thick, succulent, cellular tissue, supplied with a large number of minute vessels. Hemorrhage is likely to be very troublesome. In such cases delivery through the vagina is attended with less risk. When the sac has been fastened in the abdominal wound, free drainage, combined with irrigation, must be practised to permit the escape of the retained placenta and include the subsequent details of the treatment. When the fetus has become mummified or has formed a lithopedion, the procedure for its removal is very simple, because the placenta has completely disappeared. In patients in whom the fetus has undergone the process of degeneration resulting in the condition known as adipocere it has a strong tendency to adhere to the walls of the sac. When decomposition of the fetus occurs, and suppuration in the sac results, a fistula forms, and pus is discharged in various directions, with fragments of the fetal tissue and bones. In operation, when the fetus is dead or decomposing, operation is demanded by symptoms which indicate danger to the mother. The operation then may require a great variety of procedure. A portion of the sac may be gangrenous or may contain a putrid ovum, which will necessitate resection of the bowel; consequently we must be prepared for almost any contingency. No two cases are exactly alike, and it is, consequently, difficult to lay down any rules. Before laying open a sac, which may contain very putrid material, it is well to draw off a portion of it with an aspirator needle to cause relaxation of the sac walls and to permit the part selected for the operation to be drawn out of the abdominal wound. Sponges or gauze pads are packed about the sac to secure the evacuation of its contents without soiling the abdominal cavity. When the sac is emptied, the finger should be carried about it to make sure that there is no possibility of strangulation of the intestine, and the placenta should be disturbed only when it is loose or partly detached. When general peritonitis exists from fluids which have escaped from the sac, the abdominal cavity should be thoroughly irrigated and drainage should be employed. During convalescence the sac cavity should be frequently irrigated with antiseptic fluids, to favor the evacuation of placental debris and to protect from subsequent absorption. If we find the placental circulation has been arrested, the placenta can then be removed without risk of causing hemorrhage or laying open dangerous maternal sinuses. It is difficult, however, to determine in advance when the placental circulation has ceased. It has been found obliterated in some cases at the end of three weeks; in others at four months. After fetal death it was still going on, and the attempt at removal of the placenta resulted in fatal hemorrhage. After the fetus is dead urgency for operation is not so great, and every week that passes adds the probability that obliteration of the placental vessels has occurred. After decomposition of the fetus suppuration of the sac may result in the formation of a fistula; pus is discharged in various directions, with fragments of fetal tissue and bones.

The treatment is very simple. Dilate the sinus, remove the fragments, and let the sinus granulate and close. Partial operations in such cases are useless. As long as a particle of bone remains the troublesome sinus will persist.

GENITAL TUMORS.

475. **Definition.**—A tumor of the genito-urinary tract is a distinct swelling or protuberance which may develop upon or within the structure.

An inflammatory swelling is a tumor, but the term is here limited to those swellings which are circumscribed and can be more or less differentiated, have a chronic course, and are rarely associated with febrile symptoms.

Their division into two great classes, the benign and malignant, is of classic origin, and its clinical importance in the genitalia is equal to that in any other portion of the body.

A benign tumor is one in which the course of development is local, the progress is not destructive to life, and no tendency to recur exists after its removal.

The malignant tumor, on the contrary, in its march of invasion, little by little infects the entire organism, and shows a marked tendency to relapse after surgical intervention.

The study of the structure of growths shows a marked difference in the cellular tissue of the two classes, each having well-defined tissue changes, which render them recognizable, and from which the future progress may be predicated.

In the differential diagnosis it is often difficult to draw the line where the benign terminates and the malignant begins.

In some of the uterine and ovarian growths, particularly of the glandular varieties, we are forced to rely upon the subsequent progress for the determination of the proper classification. Notable examples are the glandular and malignant adenomas of the uterus and the papillomas of the ovary.

In the consideration of the subject we will, for more ready comparison, study separately the tumors, benign and malignant, of each portion of the tract.

VULVA.

476. **Classification of Benign Tumors.**—The tumors of the vulva and vagina may be considered as cystic and solid. The cysts may contain either gas or liquid.

477. **The gas cysts** are hernias which exist in the vulva in two varieties: the anterior labial, or inguinal; and the posterior labial.

In the anterior labial hernia the intestine or omentum descends along the inguinal canal into the large labium, and the condition is analogous to the scrotal hernia of the male. In such a hernial sac has been found the ovary, tube, and even fundus of the uterus. Cases are recorded of an ovarian cyst or a tubal gestation complicating such a hernia.

The posterior labial hernia is formed by the intestine driving the peritoneum through the pelvic aponeurosis and the levator ani muscle. The sac appears at the side of, or projects through, the vulvar orifice.

The symptoms and treatment are characteristic of hernia.

478. **Liquid cysts** should be expected in a region so well provided with glands as is the vulva. The retention cysts of the gland of Bartholin (Section 321), and *hydrocele*, a serous cyst formed by the gravitation of serum through the open canal of Nuck into the large labium, are the most important. Hydrocele is analogous to the serous collection in the scrotum of the male. The sac is thin-walled, quite translucent, and affords a distinct sensation of fluctuation.

When the canal of Nuck is patulous, the tumor can be made to disappear by elevation of the pelvis or under pressure. From hernia it is distinguished by the absence of any thickening along the inguinal canal; its translucent appearance; the presence of fluctuation; and the failure of the tumor to increase in size during coughing.

Treatment.—The contents can be readily removed by puncture, but re-collect rapidly. Obliterative inflammation may be engendered after removal of the fluid by injecting some irritating agent and bringing it in contact with the entire cavity of the sac, but care must be exercised to prevent its being forced through an open canal into the peritoneal cavity. A more satisfactory procedure will be to make a free opening into the sac and pack it with iodoform gauze.

479. **Sebaceous cysts** are common in the labium majus, but rarely attain any great size.

480. **Blood cysts** are occasionally found, which may originate in hematoma, through a hollow, round ligament (Koppe), in the sac of an old hernia, in the site of a thrombus, or from dilatation of lymph-vessels.

Cysts are also found in the hymen—Doderlein says, from fusion of adjoining surfaces; in the urethra either from obliteration of Skene's glandules or the dilatation of a terminal and unobliterated vestige of Gärtner's duct.

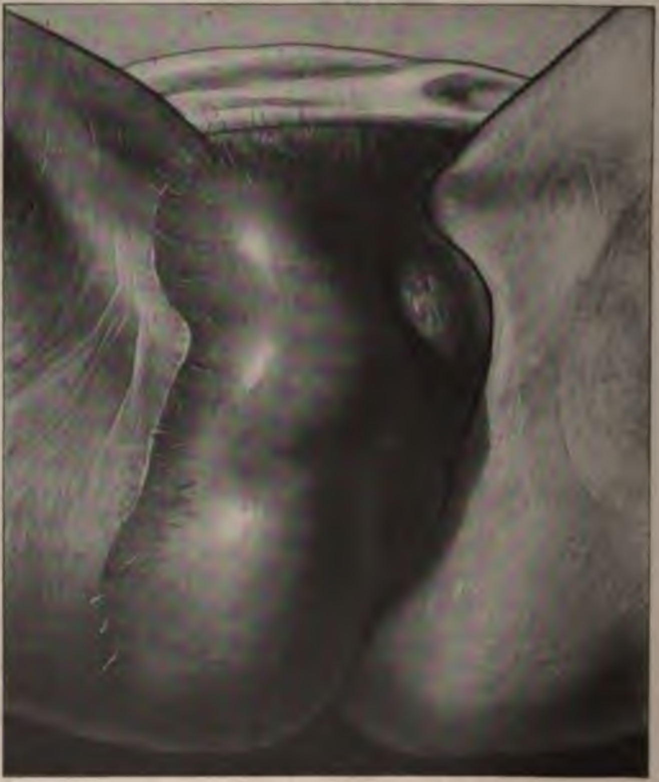

Fig. 423.—Anterior Labial or Inguinal Hernia.

Hematoma of the vulva and vagina has been described. (Section 454.)

Abscess. (Section 321.)

481. **Erectile** or **vascular tumors** are rare in the labium,

but when they occur, present characteristics similar to those in other portions of the body. Vascular growths about the urethra are much more frequent. Pozzi indicates that the hymen is not the simple isolated structure surrounding the vulva, but comprises, first, the masculine frænum vestibuli; second, the ring inclosing the urinary meatus; and, third, the hymen. The structure is the undeveloped matrix tissue of the corpus spongiosum in the male, and has not become erectile. These considerations, he asserts, throw light upon the origin of some of the vascular growths of the urethra and meatus. The retention of the erectile tissue in the female, which is normal in the male, results, through efforts at micturition, in the formation and extrusion of a polypus, known as a *urethral caruncle.*

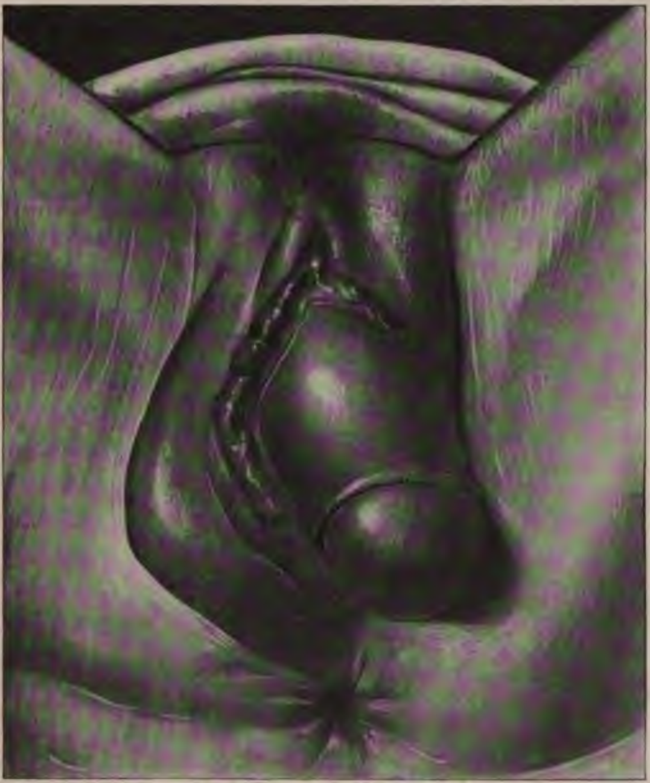

Fig. 424.—Posterior Labial Hernia.

There are other causes, in which the protrusion is more a prolapse of the urethral mucous membrane.

Etiology.—The growths may occur at any age. They are frequently seen in young children, are more frequently found in middle life, and have been seen in women as late as the seventy-fifth year.

Symptoms.—The growths are usually exposed by separating widely the vulva, which causes the tumor to spring forward. Occasionally, the growth is disclosed by introducing a finger into the vagina and pressing forward, when it will be extruded from the meatus. They rarely attain large size. The entire circumference of the urethra is occasionally prolapsed, resembling that of the rectal mucous membrane in hemorrhoids. The most frequent site of the growth is the lower portion of the meatus, from which it may spring by a broad base or become more or

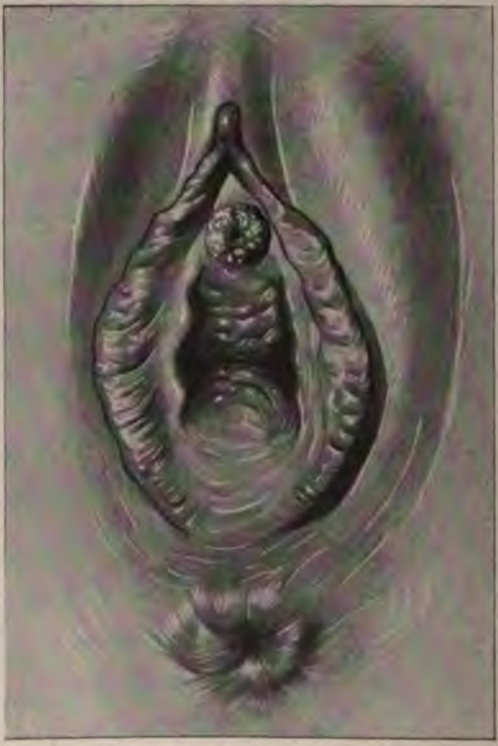

Fig. 425.—Urethral Caruncle.

less pedunculated and project from the meatus. The growth is violet or reddish-violet in color, is quite painful to the touch, and is a source of great distress in urination. The growth may be very fragile, and tears and bleeds easily.

Such growths are a cause of dyspareunia.

Treatment.—The only treatment that affords any hope of success is excision. This may be done under cocain anesthesia, the mass picked up and cut off at its base with scissors, and bleeding arrested by coaptating the surfaces with a suture. It is much more satisfactorily accomplished, however, under general anesthesia, as the patient is then quiet and the manipulation can be more deliberate. The excision of the mass with scissors and the application of the thermocautery to the base are very efficient.

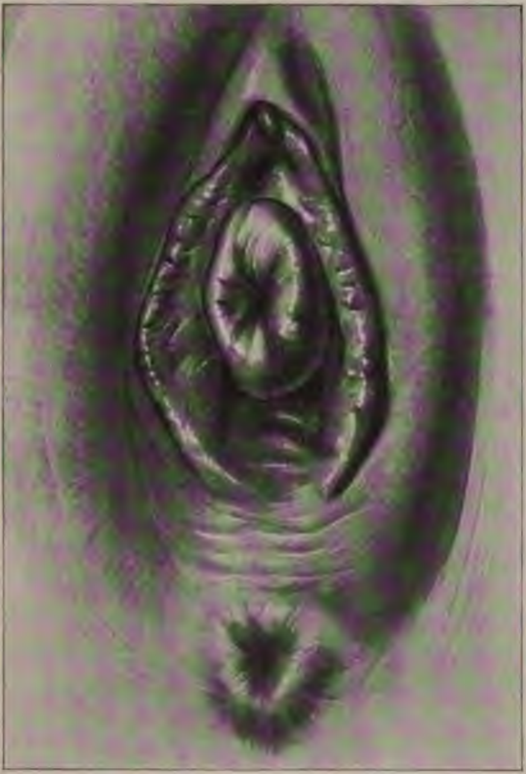

Fig. 426.—Prolapsus Urethræ.

482. Varicose Veins.—Varicose veins of the vulva are not infrequent during gestation. Holden reports a case in which the labia majora were the size of a fetal head. The patient died of phlebitis. The tumor presents a bluish color on the surface of the integument, violet on the mucous surface, and gives rise to a sensation of weight in walking or when the patient is in the upright position. The rupture of such a tumor may cause serious or even fatal hemorrhage. The patient should be cautioned to wear her clothing loose, having no constriction about the waist, and the varicose parts should be supported.

483. Neuroma of the vulva is a rare condition. Painful nodules are occasionally recognized, and their presence occasions vaginismus.

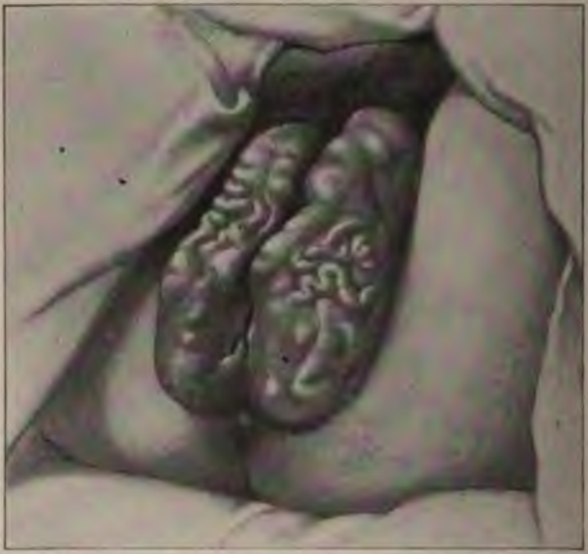

Fig. 427.—Varicose Veins of the Vulva.—(*Dr. W. Krusen.*)

Treatment would be to excise the painful spots.

484. Simple Vegetations.—Vegetations appear upon the vulva in the form of papillomata or condylomata, occasionally having the appearance of a cauliflower. They may be situated at the edge of the vulva in isolated growths, or may cover by a voluminous growth the whole surface of the external genitalia. The mass may extend backward around the anus, and may attain the size of a fetal head. The growth presents a pale red color, often a deep wine tint, and is situated upon the vulva, perineum, and margin of the anus, sometimes extending forward over the mons veneris. It is usually associated with profuse leukorrheal discharge, which is retained by these vegetations, and causes an extremely disagreeable and fetid odor. The decomposing discharges irritate the surface, which becomes greatly inflamed by

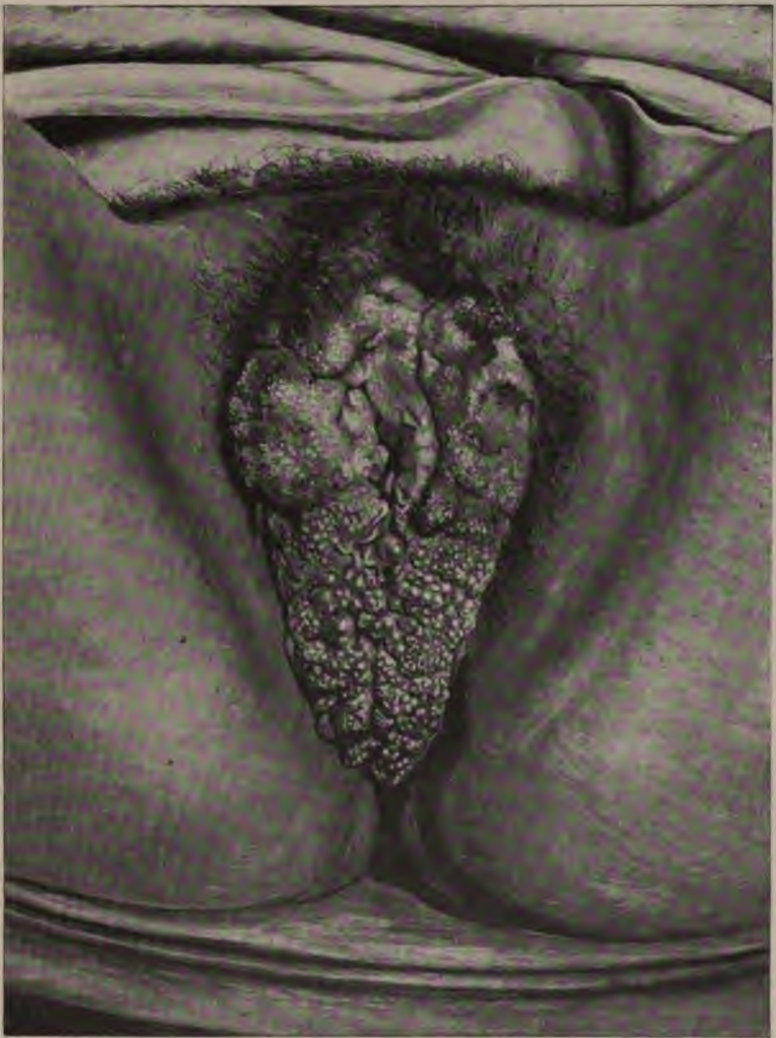

Fig. 428.—Vulvar Vegetations.

walking and exercise, and are generally considered an indication of venereal infection, produced either by gonorrheal or syphilitic virus. Transmission of the disease has been observed by contact. The presence of vegetations, however, is not always an indication of

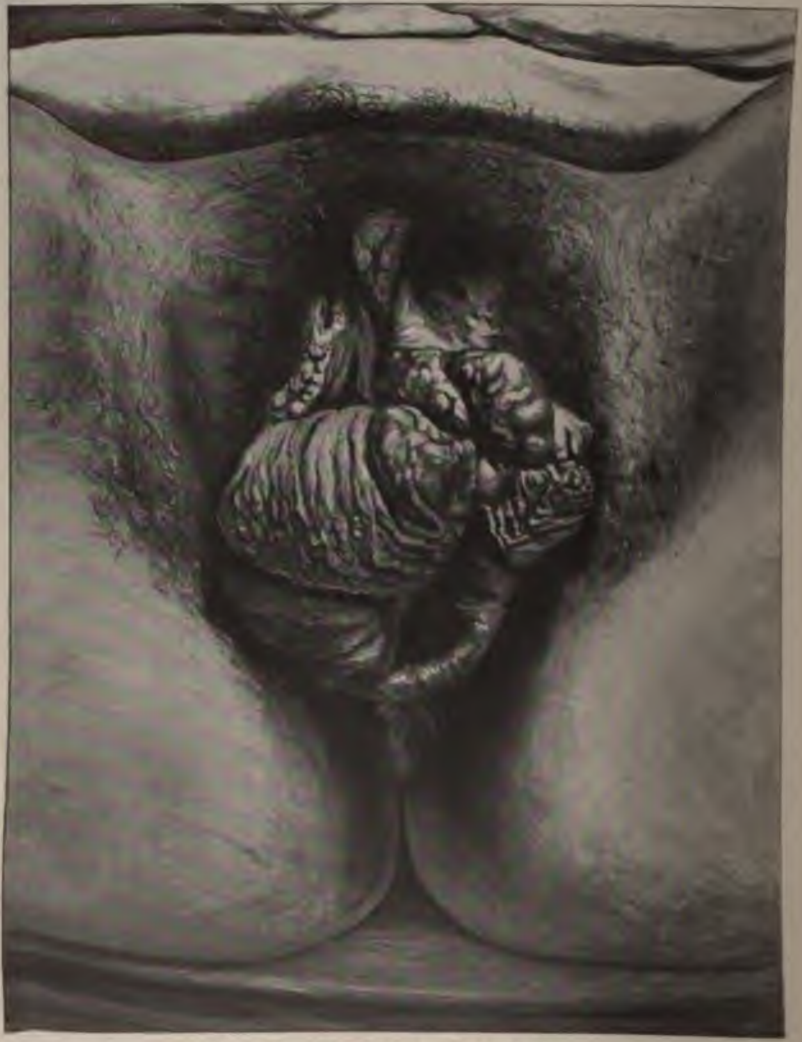

Fig. 429.—Elephantiasis of the Vulva.

specific infection, as these growths arise in pregnant women from a simple leukorrhea.

Treatment.—Keep the parts thoroughly clean, irrigate with bichlorid solution (1 : 2000), and dust the surface with equal parts of alum and sugar or paint it with carbolic acid. When the vegetations are very extensive, the most effective method of treatment is to place the patient under an anesthetic and with scissors cut away the vegetations; cauterize the base with nitric or chromic acid, or, still better, with the thermocautery, and subsequently keep the parts clean and dusted with drying powder. The convalescence will be rapid. When pregnancy exists, it need be no barrier to the method of treatment indicated, as the danger to the patient from sepsis following the delivery is much greater than any that could result from the treatment.

485. Edema.—Very marked swelling of the labia results from edema produced by anasarca. The accompanying condition demonstrates the cause. Edema of one lăbium may arise from injury or inflammation, and when it is hard and dense, is generally associated with chancre.

486. Solid Tumors.—Elephantiasis.—Elephantiasis consists in chronic inflammation of the lymphatics, with dilatation of their canals. It is very rare in our climate, more likely to exist in hot climates. The cause of the condition is unknown. The affection consists in a more or less considerable hypertrophy of the entire vulva, sometimes localized in certain regions, as, for example, in the clitoris. The large hypertrophied labia form voluminous masses, which may exceed the dimensions of an adult head.

Three forms are described: first, the entire derma is hypertrophied, with vast dilatation of the lymph-spaces; second, the engorgement of the lymph in the capillaries and large trunks; third, the lymphatic ganglia become the seat of fibrous alteration.

Symptoms.—The enlargement is frequently so great that walking and urination are interfered with. Friction of the surface leads to ulceration, which is slow to heal. The thickened tissues invade the vulva, and the perineal and anal regions, and form enormous tumors. When the surface of the skin is smooth, it is called glabrous; when roughened, with warty projections, verrucous; and papillomatous when the papillæ are much hypertrophied.

Diagnosis is easy. The hypertrophy and swelling of lupus is always accompanied by ulceration. The papillomatous vegetations are situated directly on the skin. In fibromata and myxomata which become pedunculated the tumors are isolated and circumscribed, while elephantiasis is diffuse. The cause of the condition is unknown, although it has been attributed to syphilis. It is due to an acute lymphangitis, with intense fever. The only effectual treatment is ablation and the suturing of the surface in order to secure union by first intention.

487. **Fibroma and myxoma** are tumors which are found in the large labia, though they may also develop in the nymphæ or in the perineum. They are benign tumors of slow growth, though they occasionally attain to large size. The latter become pedunculated. The tumor may be enucleated or the pedicle may be cut without danger of hemorrhage. Figure 430 shows a fibroid tumor that occurred in the practice of Dr. S. E. Cox, of Nashville, to whom I am indebted for the illustration.

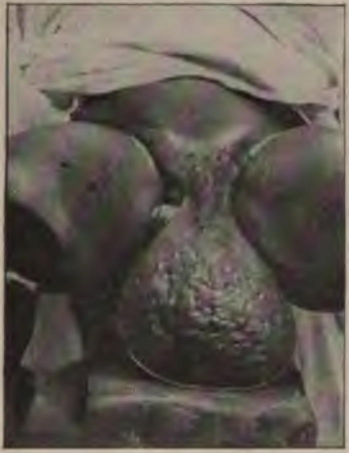

Fig. 430.—Fibroid of Labium.

488. **Lipoma.**—A lipoma is a fatty tumor of the labium which may resemble elephantiasis. Lipomata are usually small, but Stiegel removed one that weighed ten pounds.

489. **An enchondroma** is an exceedingly rare cartilaginous tumor which affects the clitoris. It may become as large as the fist and present calcified portions. Bartholin reports a Venice courtesan who wounded her paramour with her ossified clitoris.

490. **Malignant Disease of the Vulva.**—Malignant disease occurs in the vulva in the form of epithelioma and sarcoma. Primary cancer of the vulva is rare. Epithelioma is the most frequent form, and begins in the large labium or in the cleft between it and the lesser labium; less frequently in the clitoris or the meatus. The disease begins as small nodules covered with thick layers of epithelium, or follows irritation about the base of a wart. It is frequently preceded by psoriasis. Nodules shed their epithelium and cause a discharge of a watery fluid mixed with blood; superficial ulcers occur, which become deeper and involve the neighboring structures; the inguinal glands are sympathetically involved, and later are infiltrated. The disease occurs upon one side, and then spreads to the opposite, possibly by inoculation through apposition.

Sarcoma occurs in the simple form as the melanosarcoma.

Symptoms.—The patient suffers from intense pruritis, in scratching for which the nodules, previously unnoticed, are discovered. These become excoriated and cause a bloody discharge and an exceedingly fetid odor; not infrequently the nodule resembles a wart which has become irritated at its base, and subsequently infiltrated. The nodules may be sessile or pedunculated, and subsequently coalesce. When the disease occurs about the urethra, the orifice may become contracted, and the canal may appear as a hard, indurated cylinder. The ulceration presents excavated borders, with the adjacent skin infiltrated and hard, and the pubic hair may fall out. In the later stages the skin and tissues for some distance around the vulva become indurated and hard, and the glands of the groin are infected. With the extensive inflammation, the discharge, loss of blood, loss of rest,

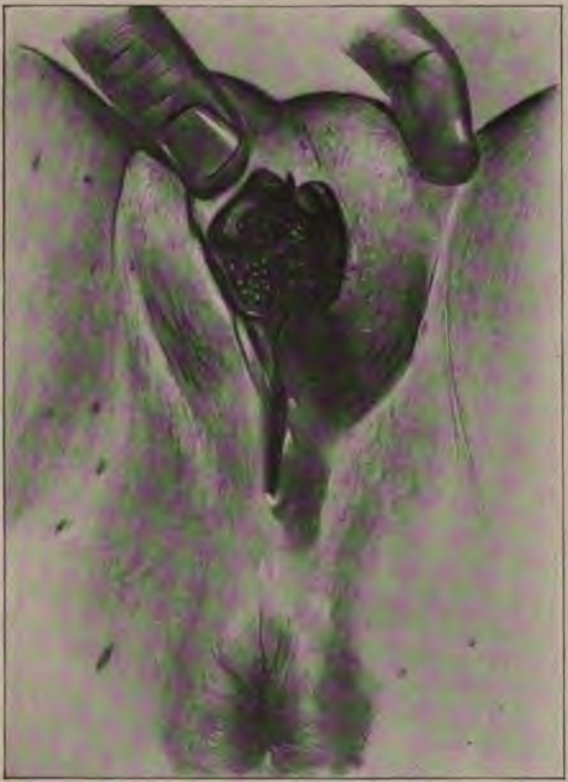

Fig. 431.—Cancer of the Vulva.

and the mental anxiety produce emaciation, and death follows from marasmus, sepsis, or metastatic development. The latent period is a long one, the disease remaining for some length of time with but slight involvement. Death occurs in the second or third year.

Diagnosis.—The history of continued genital psoriasis; intense pruritus, with small nodules; arrangement of the epithelial layer, which breaks down; the irregular ulceration, with infiltrated base and margins; and, later, glandular involvement, are sufficient to indicate the character. Papillary vegetations extend over a considerable surface, are comparatively free from induration, and in no sense resemble cancer. A polyp or caruncle of the urethra has a base free from induration. Chancre is an indurated sore without disposition to spread, and is associated with

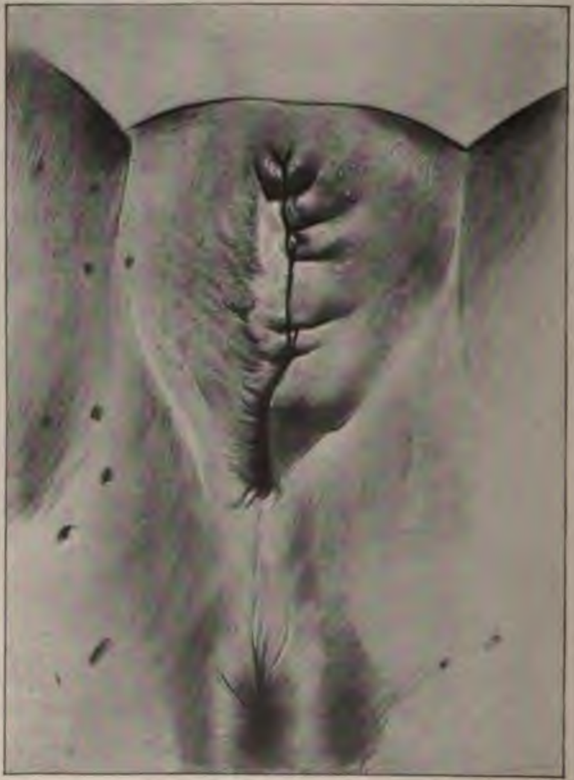

Fig. 432.—Appearance of the Vulva after an Operation for Cancer of the Vulva.

glandular involvement, and later with the syphilitic eruption. Chancroid is a superficial ulceration without induration. The adjoining surfaces readily become inoculated. The lymphatic glands promptly go on to suppuration and to the formation of buboes. In lupus the ulceration is serpiginous, with a tendency to cicatrization in the tissues first infected. Glandular involvement is rare.

The prognosis of malignant disease of the vulva is bad. The cases usually come under observation after extensive involvement, when lymphatic glands are destroyed. Operative treatment delays the progress of disease and renders the patient more comfortable.

Treatment.—The only hope for the patient consists in total removal of the disease. Some prefer the thermocautery or galvanocautery to the knife, as affording less danger from secondary inoculation. The scissors or the knife, however, are preferable, as by their use we shorten the convalescence and leave the structures less distorted. Care must be exercised, when possible, not to injure the meatus. In peri-urethral cancer, however, the sound should be introduced into the bladder, which will aid in the dissection, and the neoplasm, if necessary, should be followed to the neck of the bladder. In one case I removed the urethra up to the neck of the bladder without the patient suffering any incontinence. The incision should extend well around the disease, as far as possible invading healthy tissues. Bleeding vessels, rather frequent in this region, are secured with clamp forceps, and are ligated with catgut suture, if necessary, or the sutures closing the wound are so introduced as to constrict the bleeding vessels. Figure 432 illustrates the case of a woman who underwent operation in which both labia and the clitoris were removed and the tissue subsequently united. Inguinal ganglia involved should be extirpated. When the disease has progressed too far to render radical operation successful, the putrid discharge may be temporarily controlled by the use of the curet and cautery. When the disease is too far advanced for this, the surfaces may be kept sprinkled with iodoform and pure charcoal, dressed with gauze. The surface can be dusted with the following powder:

℞.	Salicylic acid, ...	gr. iv
	Boric acid, ...	℥ j
	Iodoform, ...	ʒ ij
	Essence of eucalyptus, ...	q. s.

Kraske advises in extensive disease that the parts be thoroughly cureted, the lacerated parts cleansed, and the surface covered with flaps of healthy skin, as this procedure renders the course of the disease slower and the symptoms less painful.

VAGINA.

Tumors originating in the structure of the vagina are infrequent.

491. **Cysts** of the vagina are very rare. They are found as isolated tumors in the membrane or are submucous. Rarely more than two or three occur in any individual case; Schroeder, however, removed six from one patient. They are more frequently found upon the anterior wall, and are exceedingly rare upon the posterior. They vary in size from that of a pea to a hen's egg. I am indebted to Dr. John C. Da Costa for the illustration (Fig. 434) of a specimen which he removed from the vagina. The contents of these cysts are serous, more or less viscid or gummy, and are sometimes found mixed with blood. The epithelial lining of the sac may be either cylindric or laminated. The origin of these growths is exceedingly difficult to determine. They have been attributed to the remains of Müller's, Wolf's, and Gaertner's ducts, to vaginal glands, or, according to Klebs, to dilated lymphatics. Neugebauer attributes most of them to remains of Gaertner's canal. Hematoma of the vagina may serve as the origin for a cyst. Glands of the urethra may form retention cysts, and, as they develop, may project into the vagina.

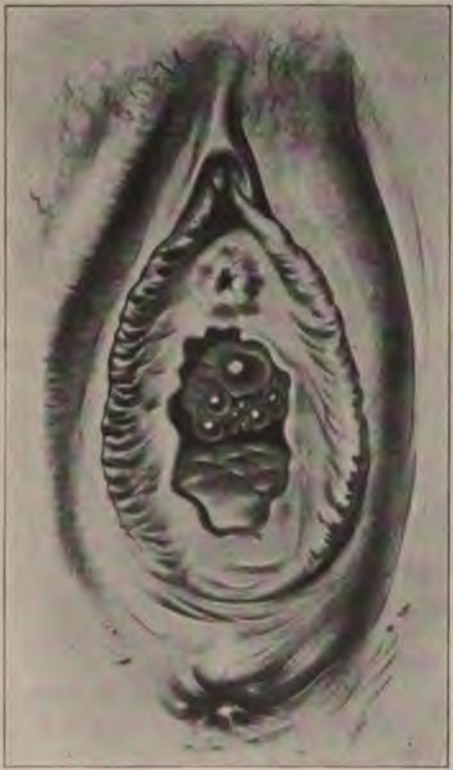
Fig. 433.—Cysts of the Vagina.

Symptoms will depend upon their size. Ordinarily, they produce no inconvenience nor discomfort. Recently a patient underwent examination for some pelvic disorder, when a cyst the size of a walnut was found upon the posterior wall.

Diagnosis.—The condition may sometimes be mistaken for cystocele or urethrocele. The use of the catheter during the examination will demonstrate its character. In the upper part of the vagina cysts are confounded with small tumors in Douglas' culdesac, such as prolapsed ovaries, a non-cystic inflammatory condition of the tubes, and other inflammatory collections. A second vagina, which is closed and filled with retained secretion, may simulate a cyst.

Treatment.—Only the large cysts require any treatment. The cyst may be opened and the sac cauterized most effectually with the actual cautery; or it may be packed with iodoform gauze, which affords drainage and sets up sufficient inflammation to obliterate the sac; or the entire sac may be enucleated.

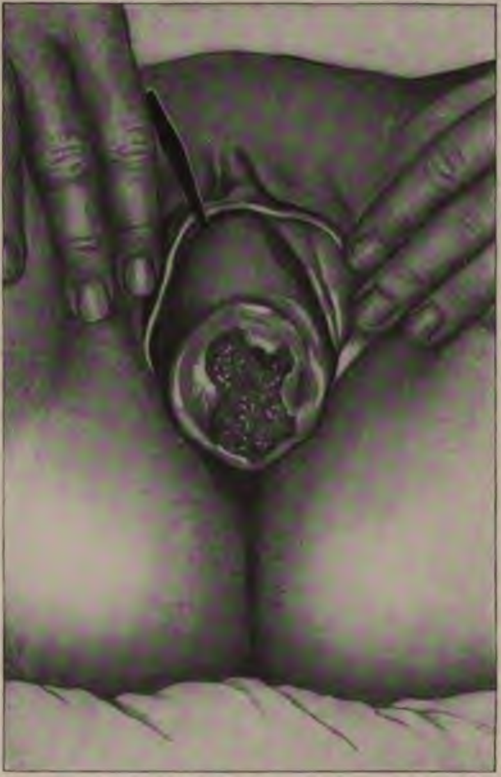

Fig. 434.—Myoma of the Anterior Wall of the Vagina.—(*Dr. John C. Da Costa.*)

492. Fibroid Tumors and Polypi.—Fibroid tumors originating in the vagina are very rare. They develop in the submucous or deeper layers of the mucosa and push into the vagina. As they increase in size they become polypoid, and hang by a pedicle. The structure is similar to that of uterine fibroids, and the growth is slow. The most common situation is the superior portion of the anterior wall. They are often adherent to the urethra, and distend the vulva. They are usually small, although they have been reported as weighing two and one-half pounds. Bandier and Gremlier report one weighing ten pounds. As these growths increase in size, they become softened and ulcerate. They are much more likely to develop during the period of sexual activity, although Tratz reported one in a child of fifteen months which attained the size of a man's fist, and Martin one ¾ of an inch long in a child two days old.

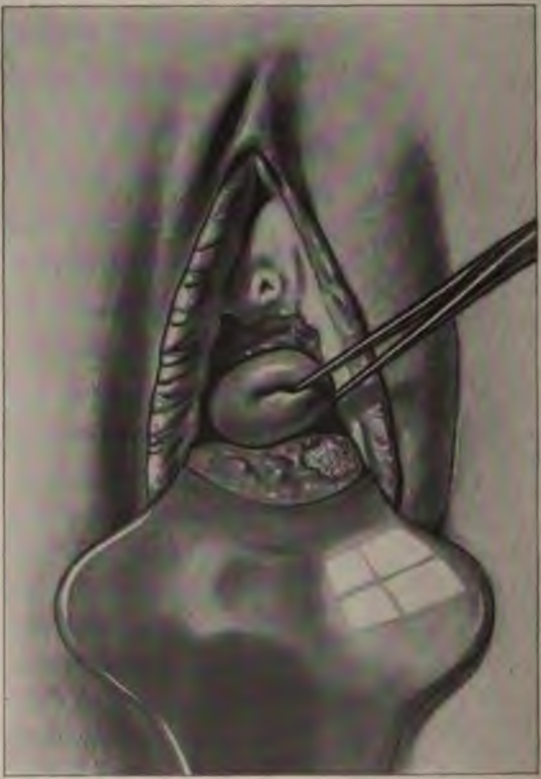

Fig. 435.—Primary Cancer of the Vagina.

Symptoms.—The symptoms of the growth are largely dependent upon its size. If small, the tumor may remain unrecognized. Larger growths cause dysuria and retention of urine. They project from the vulva, and the traction produces bleeding, ulceration, and erosion.

Diagnosis.—The growths are readily determined by the situation, slow growth, and mechanical disturbance. The softening, ulceration, and hemorrhage may sometimes lead to a diagnosis of malignant disease.

Treatment.—Treatment consists in the removal of the growth by enucleation in sessile tumors, and in section of the pedicle in polypus. Hemorrhage is controlled by suture.

493. **Papillomata.**—Papillary or warty growths are found in the vagina, generally in association with similar growths about the vulva.

494. **Malignant Neoplasms.** — In the vagina malignant growths of primary origin are very rare. They most frequently extend from the uterus, rectum, vulva, urethra, or bladder, in one of three forms: first, papillary; second, infiltrated or nodular, both of which are included histologically under epithelioma; third, sarcoma, either diffuse, or circumscribed. It most frequently occurs in the papillary form, although we may have carcinomatous infiltration, either circumscribed, forming a broad-based excrescence, or a substitution of scirrhous for the normal tissue.

Etiology.—It is most frequent during middle age, and is rare in youth, although I have seen one case of cancer of the vagina in a woman twenty years of age. Hegar once saw it in a woman in whom it was attributed to the irritation produced by a pessary. Epithelioma of the papillary form usually affects the posterior wall, as a broad-based excrescence which rapidly invades the culdesac and extends downward toward the vulva. Epithelioma of the nodular or infiltrated form appears as nodules, which become confluent, sometimes localized about the wall of the urethra. The ulceration advances rapidly, and may burrow into neighboring organs, producing rectovaginal or vesicovaginal fistula. The disease extends by the lymphatics to the pelvic cellular tissue, where it is situated in the anterior wall, and involves the lymphatic glands of the groin.

Symptoms.—It gives rise very early to hemorrhage, which will be aggravated by locomotion, coition, and the various procedures in examination. There is a profuse purulent disharge that is exceedingly offensive; pain is not so marked as in disease of the uterus, unless in the later stages. The principal symptoms are the mechanical obstruction to coition and to delivery from stenosis, and the watery, bloody, and offensive purulent discharge. In a case recently under observation the disease had involved the anterior wall of the vagina, having apparently originated in the urethra, and formed a large scirrhus-like mass extending upward over one-half the anterior vaginal wall. The patient suffered from great inconvenience in urination, frequent attacks of retention, and severe pain.

Sarcoma.—Sarcoma occurs in two varieties: first, the diffuse sarcoma of the mucous membrane, often seen in young children; second, fibrosarcomatous growths, or melanotic sarcoma. Epithelioma, or cancer, may be distinguished from sarcoma by the use of the microscope.

Treatment.—The thin wall of the vagina is very slightly resistant to the progress of malignant disorder, and the disease is rapidly carried by the lymphatic vessels to the deeper cellular tissue of the pelvis, so that by the time the patient affected with cancer or sarcoma comes under observation, very little can be done in the way of treatment beyond relieving her from the discomfort produced by the accompanying symptoms. Complete recovery is rare. Eiselberg, in a case of cancer which involved the whole of the rectovaginal septum, resected the coccyx and established an artificial anus in the sacral region after extirpating the whole of the diseased part. The patient rapidly recovered, and had control of her stools. When the disease had extended from the rectum, involved the posterior wall of the vagina and the perineum, and extended close to the cervix, I removed the coccyx, resected the sacrum, excised six inches of the rectum, removed the ovaries, tubes, entire posterior wall of the vagina, and the posterior commissure of the perineum. The rectum was stitched to the sacrum posteriorly, and to the anterior wall of the vagina anteriorly, the peritoneum having been previously closed. A colotomy had been performed upon the patient before she came under my observation. After the patient had recovered from the pelvic operation the opening in the intestine was dissected out and the two ends of the bowel were reunited. The patient was under observation for nearly thirteen months. The contraction of the intestine at the site of the former colotomy was sufficient to give the patient warning of the passage over it of feces, so that she could prepare herself for the evacuation of her bowels and avoid soiling her clothing.

495. **Tumors of the Bladder.**—New growths of the bladder are very rare in the female; the most frequent are the villous polypi, called by Rokitansky villous cancer. Albarran declared that every tumor of the bladder was malignant. The frequent deaths from uncontrollable hemorrhage and relapse would seem to justify such a diagnosis, but after careful microscopic investigation of the anatomic structure of the tumor by Virchow, he asserted that it was not correct, and called the tumor fibropapilloma, or villous polypus. The growth is most frequently situated on the lower surface or over the trigonum, though occasionally found upon the fundus and in vesical diverticula. It is sometimes completely pedunculated, so that several berry-like masses

are situated upon a single stem, which is easily torn. In women these tumors are more frequently pedunculated, while in men they have a broad base or are multiple tumors. With water in the bladder they float about like a water plant. Sometimes there are several masses of various dimensions, like grapes or raspberries, upon a single pedicle. The tumors grow very slowly. These growths absorb water, and consequently become very much shriveled when kept in alcohol. Microscopically, they consist of a thick portion, which ends in villi of thin connective-tissue frame and many large vessels. Vessels are often so well developed that they completely supplant the frame. The epithelium is then situated almost completely upon the vessels. In other cases the connective-tissue frame is thicker, so that one would incline to pronounce it a fibropapilloma. The under layers of the epithelium are cylindric in form, while the superficial are polygonal and the epithelium sends in no processes. We do not find nests or alveoli in connective tissue, so the characteristic structure of cancer is wanting. The base of the bladder-wall is thickened and infiltrated, a centimeter in thickness, which forms a crust distinctly recognizable during operation. The tumor itself is firm or soft, according to the thickness of its stroma. The pedicle is frequently so soft that, in an operation, an attempt to tie it results in the thread cutting through or tearing it off. The large blood-vessels contained in the connective-tissue frame lead to engorgement, and not infrequently to strong venous hemorrhage, which is the principal symptom of the villous polypi. These polypoid multiple tumors may fill the entire bladder. They may pass through the urethra to the external orifice.

496. **Mucous Polypi.**—In cystitis not only enlarged papillæ, but also mucous polypi, are observed. These growths have a smooth surface without papillomatous arrangement, and are poorly supplied with blood-vessels. Occasionally, they attain considerable size—from five to seven centimeters in diameter.

497. **Myoma.**—A myomatous tumor of the female bladder is much more rare than in man. The tumors are hard, whitish upon the cut surface, arise from the vesical muscular structure, and grow into the wall or become pedunculated. With the gradual thinning of the pedicle, the tumor loses vitality and becomes partly destroyed.

Cystic or softened myomata are also recognized.

Dermoid of the bladder has been recognized (Thompson).

Symptoms.—The most characteristic symptom is hemorrhage. The bleeding is very likely to occur in the night, perhaps owing to congestion from being warmly covered in bed. Bleeding takes place without any other symptom, and must be carefully investigated, as the patient will frequently assert that it comes from the vagina. The hemorrhage may suddenly cease, and the urine the following day be perfectly clear, to continue so for a number of weeks, when bleeding again recurs. After the tumor exists for some time, bleeding will become continuous.

Pain may be absent for years.

Cystitis does not necessarily exist. Indeed, small tumors may have no influence upon the mucous membrane; floating in the urine, they do not injure its epithelial surface. In spite of long-existing growths, we will find the bladder surface pale from the general anemia.

When hemorrhage leads to the suspicion of the existence of vesical tumors, the use of the catheter must be practised with care. The touch of the instrument causes injury; portions of villous growths float into the eye of the catheter and are torn off. Such masses should be carefully examined. Tumors of the trigonum float into the internal urethral orifice and obstruct the flow of urine. In long-existing tumors the urine becomes progressively bloody, coffee-like, or brownish. The surface of the tumor, from which the blood arises, appears black, red, sometimes opaque, or a bright red. The continuous vesical hemorrhage leads to intense anemia, although it is surprising how long the patient will endure it. Gradual emaciation, and finally cachexia, appear. The disease may extend over a period of many years.

Diagnosis.—Examination is practised by palpation with two fingers of one hand in the vagina, while the fingers of the other are placed over the abdomen. The patient lies upon a table or hard couch. If the bladder is emptied with a catheter, one must remember its danger. The examination is made slowly, carefully, and systematically. Generally, the abdominal walls are easily depressed. When the patient is unable to control them, an anesthetic should be given. By careful investigation a tumor as small as a hazel-nut can be recognized, but pedunculated growths may easily be displaced to one side and elude the grasp, and leave one in doubt as to their presence. The ovaries are not unusually so situated that they may be felt, and lead to the belief that a vesical tumor is present. The cystoscope aids in clearing up doubt. Diagnosis should not be based alone upon palpation. The urine should be examined chemically and microscopically. Cylinder-like cells are characteristic of papilloma. The older writers placed great stress upon the character of the hemorrhage—whether fluid blood, worm-like clots from the ureters, blood only, in the first or last portion of urine, or pure blood followed catheterization. These distinctions afforded differential diagnosis between renal and vesical hemorrhage, but are now considered of little value as compared with cystoscopy. By direct investigation the relation of the tumor to the vesical wall is observed, and bloody urine can be seen flowing from the orifice of a ureter. The bladder can also be investigated with touch with the finger introduced through the urethra, but this should be practised with the greatest prudence, and, preferably, with the little finger only, because overdilatation may result in incontinence.

Treatment.—The one treatment for vesical tumors is by operation. Following the diagnosis, the operative procedure should be employed as soon as the condition of the patient will permit. High fever, suppuration, cystitis, and marked anemia are considered as contraindications.

The removal of the growth is surprisingly easy. New loss of blood is endangered by every day's delay. Suppuration is not a contraindication. If the tumor is large, irrigation with the syringe does not secure disinfection, and suppuration ceases only after the complete removal of the mass, and thus the danger of nephritis is lessened.

The tumors may be reached through the urethra by the urethral speculum. The masses are seized with forceps and torn off, cut through by the galvanocaustic loop, cut away with scissors or forceps, or scraped off with a sharp curet. The latter instrument, however, should be used only when the finger can be introduced as a guide. Whatever method is employed should be thorough. In large, broad-based, friable tumors much injury may be done by scraping or tearing. The bladder soon fills with blood, which is hard to remove and decomposes, and the necrotic masses often cause cystitis and suppuration. Syringing the bladder with ice-water and astringents is painful.

If the pain, loss of blood, and cystitis are aggravated by the operation, it is hard to convince the patient that anything has been done for her relief. In extensive involvement or growths with a broad base the preliminary incision of the bladder is more effective and satisfactory, as by it the diseased structure and the field of operation are exposed to view and to more effective manipulation.

Vaginal Incision.—As a guide a catheter is introduced into the bladder, upon which a longitudinal incision is made through the middle line of the vagina, about five centimeters long, of sufficient length to permit the introduction of two fingers. The incision can be enlarged with scissors or with a knife above and below, affording considerable exposure of the bladder and its morbid growths.

Bleeding vessels are secured by pressure forceps. The growths are then removed with forceps, scissors, knife, fingers, the galvanic loop, or the Paquelin cautery. In copious hemorrhage syringe with either ice-water or quite hot water; cotton sponges wet with the latter may be pressed upon the bleeding surface. Sutures can not well be used, because they cut through. The precaution must be exercised to avoid injuring the ureters. Hemorrhage is very severe in these operations and greatly obscures the view. The fistula should be closed, a catheter introduced, and the vagina tamponed to compress the bladder and decrease the bleeding. An ice-bag should be applied over the lower abdomen.

The trifling mobility of the bladder in the region of the trigone renders it difficult to expose a bleeding vessel through the vaginal incision, and the bleeding renders the field but little more accessible to view than through the dilated urethra, while through the latter the organ can be tamponed even more effectively than by the vaginal incision.

Abdominal Incision.—The sovereign procedure is the high bladder incision. A transverse incision gives more room than a vertical, though the two may be combined in a T-shaped cut. The difficulty in securing firm union and prevention of ventral hernia subsequently, however, preclude its practice. The vertical incision requires strong traction to be made on each side. Fritsch prefers the transverse incision, claiming that recovery is excellent if the incision is not made too long—not over six or seven centimeters. The scar so disappears under the hair of the mons veneris that subsequently it is no more seen, even if the wound heals by secondary intention. It has the additional advantage that large vessels are not likely to be cut. He has seen a number of cases in which extensive hernia had formed above the symphysis, but these were cases in which the object of the operation had been castration. Suprapubic transverse section had been employed in the operation for castration, or cases in which the Trendelenburg posture had been employed for operations upon bladder fistula. In all these cases the scar tissue could still be seen. In twelve of these cases the incision had been twelve or more centimeters long. Such an extensive incision is unnecessary in bladder operations. If the incision is made shorter, the recti recover, with a firm scar to the pubic bone.

Fritsch describes the procedure as follows: The patient is placed in the Trendelenburg posture, with pelvis elevated, and the mons veneris and vagina are thoroughly cleansed. The bladder must also be thoroughly irrigated; the vagina, for the reason that the fingers may be required to be introduced into it, in order to penetrate the bladder from above. The bladder should be irrigated with several liters of boric acid solution. It is better to employ a large quantity of water than a trifling quantity of disinfectant solution. If the urine is clear or the discharge of blood quite fresh, syringing is unwise, as it can easily cause a hemorrhage. An assistant places his hands upon the abdomen in such a way as to keep the movable skin fixed, while a transverse incision is made above the symphysis. The point at which the incision is to be made should be fixed before the skin is put upon the stretch; otherwise upon drawing it up it may be found that the incision is too low. It should be made directly over the upper border of the symphysis. While one is operating in the loose fatty tissue behind the symphysis, an assistant pushes up the bladder with a thick male catheter. The projection made by the end of the catheter is readily seen, the tissue above it is picked up with a tenaculum, and the bladder-wall is cut transversely above the end of the catheter. As soon as the bladder is opened the margin on either side is seized with a pair of pressure forceps and the bladder is prudently drawn down so that the forceps will not tear. The catheter is removed and the incision extended right and left by scissors until a broad wound is made in the vertex of the bladder, which will permit one conveniently to enter it with two fingers and inspect its inner wall. In this, as in all operations, it is important to proceed rapidly. The margin of the bladder is seized by ten or twelve pressure forceps, which hold the bladder open automatically and make its cavity visible. To sew the bladder to the margin of the wound would take more time. If the tumors are large and deeply situated, they may be discovered to the right or left by two fingers. The pedicle is seized between the fingers and the tumor prudently drawn up. As the structure tears easily, the bleeding point may sink back and vanish from view; when the bleeding is copious, one may be in doubt just what shall be done. It can be controlled promptly only through tamponade, which takes time; consequently, it is important, if possible, not to tear the tumor.

Having fixed the situation of the tumor, one must make accessible the pedicle. This not infrequently may require an enlargement of the skin and bladder section. To avoid this, an assistant seeks to enter the vagina, and presses upward in the region of the pedicle. Hemorrhage may be controlled by a Paquelin thermocautery. The smallest points should be employed, in order to avoid extensive burning of the epithelium of the bladder. The ideal procedure is the employment of the galvanocautery. In small polypi and very small tumors the galvanocaustic loop does not act so well. To tie them off, is, of course, difficult, as the thread easily cuts through. Frequently the base can not be encircled, on account of the proximity of the ureters. If we pass a ligature deeply in the firm tissue, we may injure or occlude the ureter. A hot iron is not effective in arresting the bleeding, and yet this must be controlled in order to proceed. More favorable action is accomplished by long and continued direct compression of the wound from the vagina and bladder. A strong vaginal tampon has a good influence. Ice-water may be used with advantage, and influences the closed bladder still better. In the open bladder the influence is not direct on the bleeding vessels, as the bladder muscle, like that of the uterus or the placental part, contracts on the bleeding surfaces. When the pedicle is quite visible, so that with the Paquelin one can touch the proper place, we should employ the scissors to cut the growth away. The smooth, well-marked, cut surface can be compressed by the finger of the assistant, in the vagina, with a certain advantage. It may be necessary to tamponade both vagina and bladder and to apply a firm abdominal bandage. This method is effective in controlling hemorrhage.

The means by which hemorrhage is to be controlled must be rapidly determined upon, whether it be the Paquelin, the application of a solution of iron, syringing with ice-water, or surrounding with needle clamp forceps. The tampon should be prepared beforehand, and should be ready. In large, broad-based, villous growths we should work with sharp curet and scissors. Hemorrhage is often quite considerable. If the tumor is situated in the trigonum, so that there is no danger of injury of the ureter, the base of the bladder-wall can be penetrated and ligated. The possible discharge of urine through stitch-holes is of no significance, for in Shucking's operation for uterine fixation it is probable that the needle has frequently entered the peritoneal cavity, and it is only in rare cases that peritonitis appears. The necessity of preventing hemorrhage by a tampon after the operation excludes the possibility of complete suturing of the wound. We can, of course, draw together the bladder wound somewhat, as well as diminish that in the skin through lateral sutures, but in the middle it must be kept open for the eventual renewal of the tampon. In such cases it should be the rule to sew the bladder to the skin wound, in order to make its cavity accessible and to secure the tissue behind the bladder from overlying urine and wound secretion. As the patient recovers, the bladder suture cuts through, the organ sinks back, and the wound opening is gradually closed by granulations. When the opening continues too long, it should be narrowed by suture after artificial freshening of the wound. A permanent catheter should be introduced, which is necessary in all bladder injuries. With an incision into the bladder vertex, or in bladder resection, do not completely close the bladder wound. Place a strip of iodoform gauze in the opening left in the bladder wound. It has repeatedly occurred that the patient accidentally or purposely has had the catheter removed, when the urine can flow from the wound without injury; but if the wound is entirely closed, the removal of the catheter would work injury to the processes of recovery. After the bladder tampon is removed hemorrhage rarely occurs. Bloody urine disappears in from twenty-four to thirty-six hours after the removal of the tampon. While the catheter remains, the bladder should be irrigated with astringents or a weak solution of liquor alumini acetici. This direction applies also to the external wound, and the pledget should be wet with the same solution. The upper wound has a great tendency to close. If the granulations are weak, as in anemic patients, they can be stimulated by dilute alcohol, camphor, silver salts, or tincture of iodin. The appetite, which is lost through an excessive flow of blood from the tumor, improves, and the patient gains rapidly in weight. The patient should be permitted to rise from bed as soon as the wound is healed. When the operation is very late in the progress of the disease, the wound remains unaltered, the patient does not recover from the anemia, and does not regain her appetite. Whether the patient dies from loss of blood, from loss of strength, or by the influence of the operation, is difficult to determine.

498. Carcinoma.—Klebs asserted that cancer of the bladder always began in the prostate. Had this assertion been correct, woman should be exempt from the disease. Primary cancer of the bladder has been described by a number of investigators. Bode alone has seen fourteen cases. Cancer appears as a hardening and thickening of the bladder-wall, which is covered with several layers of epithelium. Small tumors form in the periphery, sometimes as isolated masses, while complete infiltration of the entire bladder is very rare. Following the destruction of the epithelium, destructive ulceration of the cancer occurs. This takes on a malignant character if putrid germs appear in the bladder.

Symptoms.—The urine smells like carrion; there is pain and vesical tenesmus. By rapid increase the carcinoma breaks through externally. High fever appears. The bladder with rapid growth of carcinoma is fixed in contraction in the paravesical tissue. With the peritonitic irritation there is increased sensibility. The disease extends up to the ureters, and develops pyelitis on both sides, interstitial abscesses, or nephritis. If death has not already taken place, it occurs through fever and cachexia. It is found that the ureters become dilated as a result of the pressure upon those portions situated within the bladder-wall.

Uterine cancer simulates the symptoms of villous tumors. In infiltration of the bladder-wall symptoms of cystitis appear. It is sometimes asserted that after extirpation of villous tumors carcinoma occurs in its place, but pathology does not seem to sustain the possibility. The existence of malignant disease does not contraindicate operation, though it is necessary, in order to remove the matrix of the tumor, that a portion of the bladder-wall should be removed in order to operate in healthy tissue. In the adoption of this principle a portion of the bladder-wall, the trigonum, must be omitted. To remove it, we must remove the ureters, or at least the place at which they enter the bladder. Bardenhauer, in a case of extensive disease of the bladder, through an abdominal incision upon it, shoved back the peritoneum, loosened the bladder as far as possible from the perivascular tissue, raised it up, incised it longitudinally, secured it with sutures, and drew it into the abdominal wound. The now exactly determined tumor is, with an elliptic piece of the bladder-wall, excised, and the wound margins are united by continuous suture, sparing the mucous membrane. Finally, the belly wall is sutured and a continuous catheter introduced. Wassiljew reports a case of total extirpation of the bladder for malignant tumor. The ureters were secured outside the bladder and sutured in the belly wall. The patient recovered, although both ureters became necrotic, in two centimeters of their course; but the pyelonephritis improved, as well as the general condition. Bensa describes a case in which a greater portion of the bladder was extirpated on account of an infiltrated carcinoma of the right bladder-wall in a woman fifty-one years old. The operation was accomplished by a median incision in the mons veneris; the symphysis pubis was separated and the bladder opened and loosened subperitoneally, except on the right side, where the peritoneum tore, but was immediately sutured again, then loosened on the left side; the left ureter was resected, and the under part of the right ureter, because it had been invaded by carcinoma. The ureters were replaced in the small remains of the bladder, which was closed by sutures. The symphysis was then closed with silver wire sutures and the wound tamponed above and below the symphysis. The patient died the day after the operation. Bensa holds total bladder extirpation as indicated, first, in benign tumors if they are multiple and produce sufficient disturbance of the bladder function; second, in infiltrated malignant tumors if they occupy the greater part of the bladder-wall; third, in large, broad-based tumors of the base of the bladder. The entire bladder has also been resected for tuberculosis. How much advantage is to be obtained from these procedures is a question. Narrowing of the ureters in the artificial bladder and small abscesses from implantation and sutures cause disturbance for months, even though the case has been quoted in literature as a successful result. After extirpation of the bladder the ureters have been implanted in the vagina. While the vagina is normally aseptic, it is questionable how long it will so remain with this additional abnormal function.

UTERUS.

499. Fibromyomatous Tumors.—Myofibromata are benign growths which occur in the cervix as well as in the body of the uterus. Their structure consists of connective tissue, or of muscular combined with connective tissue. The former are indicated by the term fibroma; the latter as myoma or fibromyoma. The pure myomata consist only of muscular structure and exist only in the early stages.

The myomata are the most frequent of uterine growths. Careful examination will disclose such a growth in 20 per cent. of all the women who have reached the age of thirty-five years (Bayle), in 40 per cent. of women of fifty years (Klob), but the great majority are small. The growth of the tumor is very slow; when rapid increase in volume is observed, it arises, not from an increase of tumor elements, but from a disturbed condition of tissue fluid, which will be considered later. The most favorable condition for rapid growth is an intimate vessel union with the uterus.

It is the generally accepted view that fibroid growths increase in size only during the period of sexual activity, and remain stationary or undergo atrophy after the climacteric. It is quite probable that no myoma ever originates in the uterus prior to puberty or subsequent to the menopause. A tumor has been reported as having been found in the uterus of a girl aged ten years, but no opportunity was afforded to demonstrate the correctness of the diagnosis by microscopic investigation.

Sutton has reported a childless widow, who had never menstruated, as having carried such a tumor for ten years. Peter Muller and Joseph Taber Johnson both assert that the growth sometimes continues to increase after the cessation of menstruation. Hoffmeier says that such increase occurs in those myomata which stand in nutritive union with the peritoneum through organized bands of adhesion. The truth of this is especially indicated in omental adhesions, which greatly influence the progress of the growth. He cites a woman in whom a thirty-five-pound myoma, with numerous interstitial and omental adhesions, had continued to grow for a year after the menopause.

A myoma is rarely found alone in the uterus. The disease generally exists as a multiple tumor formation. Over fifty growths have been found in one uterus. They vary from a tumor the size of a pea to an enormous growth. Hunter removed, after death, a tumor that weighed 145 pounds, while the woman weighed but 95 pounds.

How much the sexual functions influence the growth is undetermined. It is possible that the tumor originates independently of sexual irritation, while subsequent growth is favored by intercourse. Some regard sterility as a cause; others, as a consequence.

Winckel and Schroeder consider that the following conclusions are justified:

1. Fibroid growths originate without relation to marriage or to pregnancy.
2. Sexual excitement favors growth.
3. The presence of a growth inclines to prevent child-bearing.
4. Pregnancy promotes growth.

500. **Pathologic Anatomy.**—Whatever the origin, they are found in either the body or the cervix of the uterus, but in large proportion in the former situation, and more frequently in its posterior wall.

The consistence of the growth varies with its structure. A soft muscular mass presents, upon section, a reddish-pink color, with wavy, glistening bands running in every direction, but with a tendency to form whorls about individual centers, owing to the origin of the disorder along the course of blood-vessels. The cut surface of a fresh section presents an uneven appearance, owing to the elasticity of the fibrous tissue, causing the softer muscle surfaces to bulge. The mass is enveloped by a false capsule, produced by compression changes in the uterine structure. The capsule varies in thickness according to the site of its development. If the growth has originated in the middle layer, the capsule is thick and well formed; but if immediately beneath the peritoneum or the mucous membrane, the capsule will be very thin or may even be absent.

About the tumor is a layer of loose connective tissue, which permits ready enucleation. Occasionally, there are numerous fibrous bands to the capsule, which render enucleation difficult, and are so frequent as to appear like a hyperplasia.

The tumor is surrounded by numerous large vessels, from which it is nourished, but which do not penetrate its substance to any great depth.

The vascularity of the structure is slight as compared to that of the uterine wall, for well-formed vessels are rarely found away from the circumference. In the softer variety the blood-vessels are comparatively numerous; in the harder varieties they are very scant.

501. Microscopic Appearance.—The comparative amount of muscular and connective tissues varies widely. In young and rapidly growing tumors the muscular tissue predominates and the capsule or line of demarcation between growth and uterus is ill defined. As the tumor becomes older and more mature, there is a substitution of connective for muscular tissue, and it becomes hard and dense. The section differs in appearance according to its direction. A longitudinal section presents an elongated shape and rod-like nuclei, while a transverse section resembles groups of round cells. Occasionally, between the muscle bundles are spores—lymph-glands lined with endothelium. They develop from proliferation about the capillaries, and, with increase of connective tissue, may grow to large size.

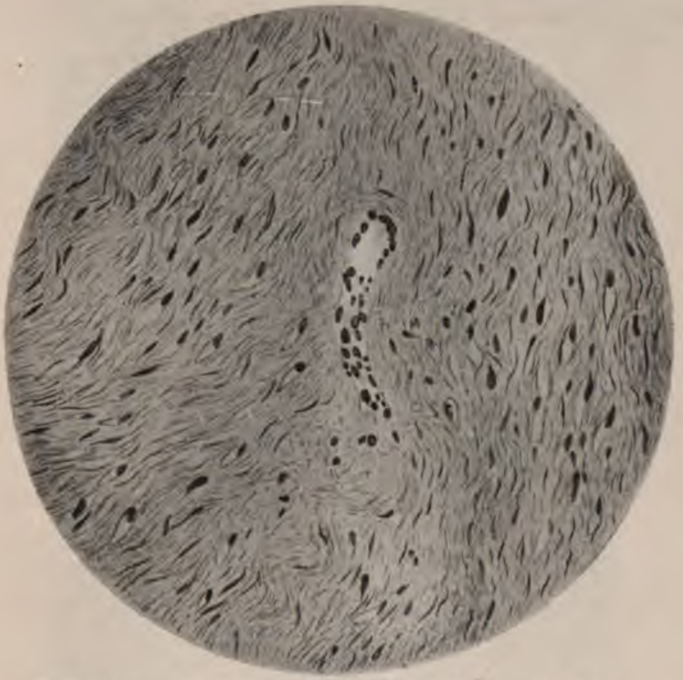

Fig. 436.—Microscopic Section; Myoma Uteri.—(*Coplin.*)

502. Varieties.—As we have previously seen, these growths present varieties according to the structure, but they are generally designated from their situation. All myomata originate in the uterine wall, but upon their proximity to its inner or outer surface depends their future progress. They are divided into submucous, intramural, subperitoneal or extramural, and interstitial or mural.

503. **Submucous fibroids,** according to their proximity of origin to the mucous surface, present two varieties—the encapsulated and the noncapsulated or free. The former develop in the wall and are extruded beneath the mucous membrane by the uterine contractions. The second variety, the free, originate immediately beneath the internal surface, and are not supplied with a capsule, but are closely enveloped by the mucosa. An encapsulated tumor may become free through absorption or thinning of its capsule from pressure.

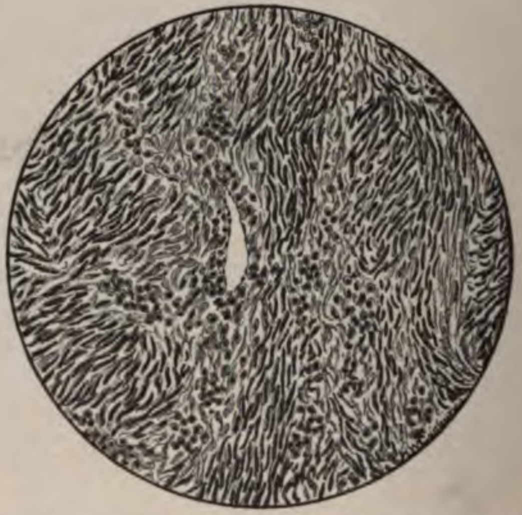

Fig. 437.—Liomyoma of the Uterus. B. and L., ⅙ in. obj.; 1 in oc.

The encapsulated variety are much larger than the free. Nature regards such growths as foreign bodies and endeavors to extrude them from the uterine walls. Under this action a submucous fibroid may become pedunculated, and is known as a submucous or fibroid polypus. The muscular capsule may resist expulsion and prevent pedunculation, while the tumor bulges into the uterine cavity from a more or less broad base, and is called a sessile submucous fibroid.

The sessile and pedunculated submucous tumors enlarge the organ and increase its vascularity. The repeated contractions, together with the expulsive efforts, lead to hypertrophy of the muscle-wall to such a degree as to simulate pregnancy. The circulation in the entire mucous membrane, and especially in that portion covering the tumor, becomes obstructed, leading to severe hemorrhages.

The severe pressure frequently causes atrophy and ulceration in the free variety, and the production of grave secondary changes, such as sloughing and gangrene. Compression of the neck of a polypus may cause edema, and, when acute, can produce gangrene or sloughing of the mass, and a fatal termination. In the slower form the chronic edema may often be mistaken for a cyst. Uterine contraction may lead to elongation of the pedicle of a pedunculated fibroid and cause its extrusion from the exter-

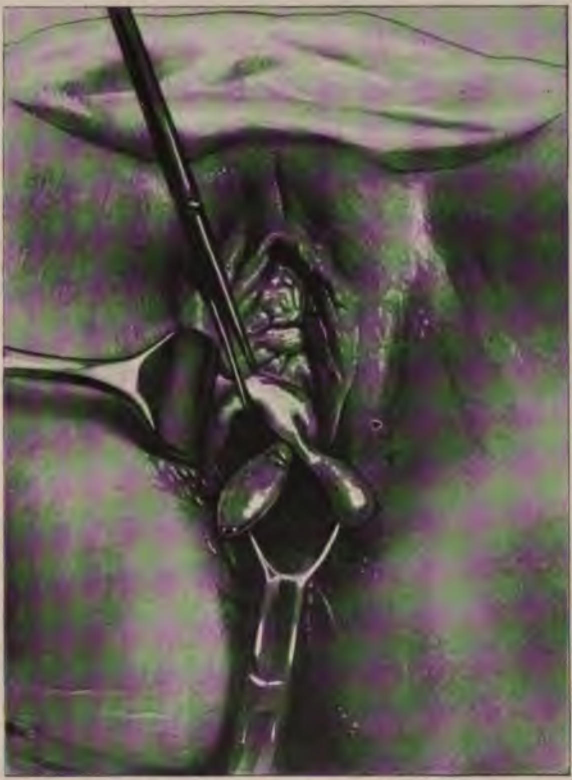

Fig. 438.—Submucous Myoma (Polypoid).

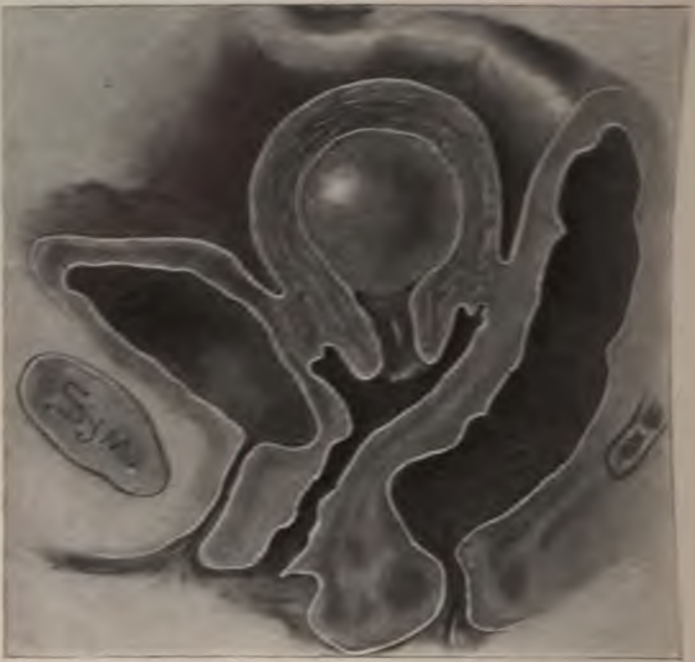

Fig. 439.—Sessile Submucous Myoma.

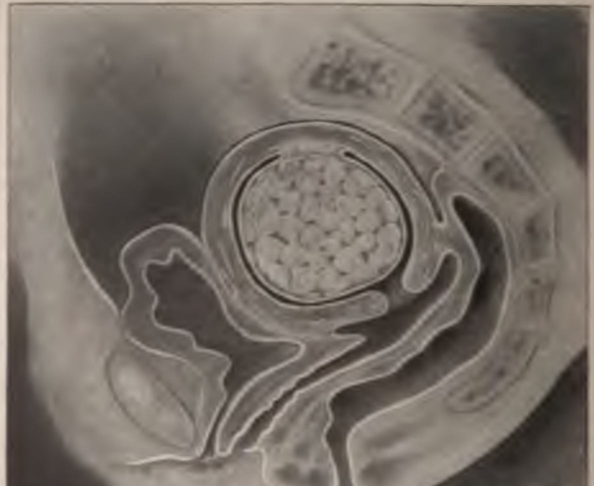

Fig. 440.—Submucous Myoma Occupying Uterine Cavity.

nal os into the vagina, where it can be readily recognized and removed. The elongation of the pedicle may become sufficient to permit the mass to hang from the vulva. The expulsion into the vagina may be sudden, but it generally occurs slowly. Very rapid expulsion of a tumor with a short pedicle may produce partial or complete inversion. Not infrequently the polypus may be felt projecting from the os during menstruation, while it disappears during the intervals; this condition is known as intermittent polypus.

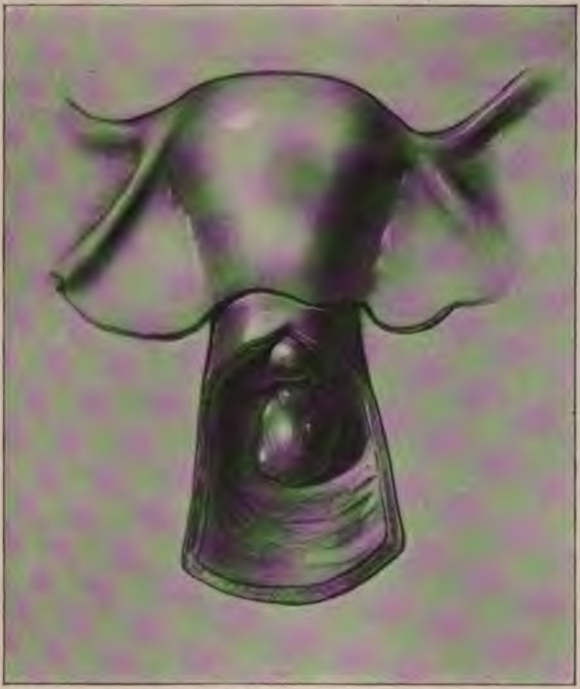

Fig. 441.—Submucous Myoma Extruded into the Vagina.

Rarely by the efforts of the uterus the tumor may be completely and spontaneously separated and extruded.

The pressure of the uterine or vaginal wall upon the tumor sometimes causes ulceration, from which adhesions may form, by which the nutrition is maintained. A polypus may be so firmly gripped by the cervix as to cut off its supply of nutrition and cause it to slough. The gangrene may spread upward and produce a fatal result. Such a condition can easily be mistaken for cancer.

504. Symptoms.—The principal symptoms are hemorrhage, pain, and abdominal cramp. Hemorrhage is the most prominent symptom in the submucous variety, though it may also characterize the interstitial; but it is very rare in the subperitoneal. The bleeding varies, and has no relation to the size of the growth, as small polypoid growths cause just as severe hemorrhage as the large tumor.

In the submucous growth the menses become profuse and prolonged, assuming the character of menorrhagia, with resulting anemia and debility The bleeding may be continuous or very free for a few days, and then a period of brownish secretion, to be again followed by profuse bleeding. The blood may be discharged as bright fluid blood or in large clots. The clotting has no significance, and depends upon the size of the uterine cavity in which the accumulation becomes clotted, or it may occur in the vagina.

Associated with pedunculated polypi, flooding and intermenstrual hemorrhage may alternate with periods of amenorrhea which may continue for months; and when the patient believes she is about well, another hemorrhage occurs. The bleeding occurs from two sources: first, the covering mucosa of the tumor; second, the general uterine surface. The former is the active primary site of bleeding, and is very vascular, particularly in the free variety.

Metrorrhagia from rupture of veins in the superimposed mucosa is frequently associated with a profuse watery discharge, which adds to the depression and prevents the patient from regaining her health.

Leukorrhea or discharge other than blood is increased during the progress of the submucous growths. Its extrusion into the uterine cavity stimulates the normal watery discharge of the uterine glands, which is admixed with desquamated epithelium, pus, and blood-cells, according to the changes of the uterine mucosa. As the cervix dilates, its glands add their thick, viscid secretion to the abundant discharge. The partial or complete extrusion of the growth affects its circulation and produces necrosis of portions of its surface or of the entire structure, according to the extent of the constriction. The discharge is then bloody, purulent, or watery, contains necrotic masses or detritus, and causes an extremely offensive odor. The patient, and not infrequently her attendant, is induced to believe in the existence of malignant disease.

Pain is not a constant symptom. It is frequently more a sensation of weight or pressure in the pelvis or upon the surrounding organs. Intense pain may characterize very small growths, and is conditioned somewhat upon their situation; a growth so pedunculated or placed upon the uterine wall as to project into the internal os may act as a ball-valve and be the cause of the most labor-like pains. This form of dysmenorrhea I have frequently seen, and in one patient it was so severe as to require two grains of morphin at each menstrual period to render it endurable. She had a double vagina and a bicornate uterus with two distinct cervical canals in a common cervix. In one of these cavities was found a submucous tumor, which by a nipple-like projection filled up the internal os.

Sterility is a common symptom, and conception is the exception. The changes in the mucosa render its condition unfavorable for the reception and retention of the fecundated ovum. More frequently than is generally appreciated the tubes have undergone secondary changes resulting in occlusion of their abdominal extremities, and they form retention cysts.

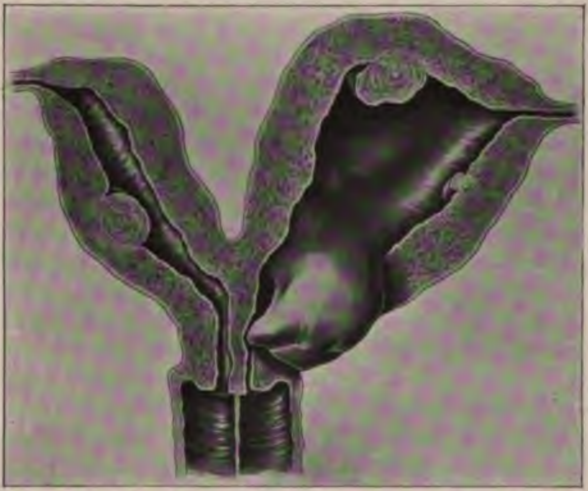

Fig. 442.—Bicornate Uterus. Both Cornua Containing Myomata.

Constipation, hemorrhoids, anal fissure, prolapse, and pain arise from pressure upon the rectum, vesical tenesmus, cystitis, frequent micturition, retention of urine, dilated ureter, and hydronephrosis from obstruction to the urinary organs. Not infrequently the first symptom which leads to the discovery of the growth is the retention of urine from pressure upon the vesical neck. Long-existing myoma is a frequent cause of renal dilatation, even of sacculation, from pressure upon the ureter.

General Condition.—The protracted hemorrhages, profuse discharge, severe labor-like pain, and pressure upon the neighboring viscera produce a profound anemia and a straw-colored appearance of the skin, often so marked as to simulate a cachexia and plainly to indicate the gravity of her condition.

505. Diagnosis.—The profuse hemorrhages which occur during the period of menstrual activity take place not infrequently in the unmarried; pain, aggravated at the menstrual periods, often labor-like in character, and the marked anemia without emaciation should awaken the suspicion of a submucous myoma. There are, however, no characteristics of myomata, and we are forced to rely upon the physical signs. An important factor is the consistence of the tumor or tumors in contrast with the surrounding soft structure of the uninvolved portions of the uterus, which permits of the determination and delimitation of the growth. The alterations of the shape of the uterus according to the situation are of interest. A good-sized growth may fill out the organ and give it a spheric shape; the further contraction of the uterus drives the mass into the cervix, where it may take up the entire organ, and show at the external os. The polypus is determined only by palpation through the cervical canal. If the os is sufficiently open, the pedunculation may be inferred by the mobility, and may be determined by reaching the pedicle with the finger.

The *sound* is advocated for precision, but it may enter a soft fibroid, or may pass around the growths without disclosing their presence.

During the menstrual period, with profuse menorrhagia, the offending growth is frequently extruded or the cervical canal is more widely dilated, permitting the growth to be readily recognized. The growth extruded during the flow is generally drawn back in the interval, and produces what is known as an intermittent polypus.

506. Differential Diagnosis.—The accurate diagnosis of any condition is determined only by reviewing the conditions with which it may be confused. They are:

Pregnancy.
Inversion.
Carcinoma.
Abortion.
Subinvolution with endometritis.

The amenorrhea, subjective symptoms, regular growth of the uterus, absence of hardness in its walls, and sensation of elasticity are generally sufficient to determine the diagnosis of pregnancy. A limited amenorrhea may characterize a submucous myoma, while hemorrhage occasionally complicates the early months of pregnancy. The myoma may be edematous, and small subperitoneal nodules may be mistaken for the extremities of the fetus.

The presence of a fibroid does not preclude the possibility of pregnancy as a complication. The regular shape, size, and outline of the uterus under the bimanual, with the contractions of the pregnant organ, which are absent in the nonpregnant, should establish the diagnosis.

Inversion.—Sometimes complete inversion is associated with a myoma with a short pedicle, attached near the fundus. The efforts at extrusion of the mass after dilatation of the cervical canal cause a dragging upon the fundus and gradual inversion; a polypus with a moderately thick pedicle is extruded from the os, and may be distinguished from the body of an inverted uterus with difficulty. The myoma is less sensitive than the uterus, while the latter generally shows evidence of the orifice of a tube upon either side. In each condition the neck of the uterus can be felt encircling the pedicle of the tumor like a cuff.

In inversion a sound can be passed an equal distance upon all sides, while in the polypus it passes upon one side the length of the uterine canal. Traction upon the mass while the finger is passed into the rectum reveals the cup-shaped cavity of the inverted uterus, while in the other the uterine fundus will be found in its normal situation. Traction upon the mass with recto-abdominal touch determines the diagnosis.

Carcinoma.—The profuse bleeding, the pain, and the foul discharge from a necrotic fibroid render the theory of malignancy plausible. Cancer involves the mucous surface of the cervix and its canal. The hypertrophied malignant tissue breaks down under pressure and is very friable. The fibroid extruded into the vagina, and subsequently necrotic from constriction, is globular, and is necrosed only upon its inferior surface, while the upper portion is smooth and firm and is in no sense friable, while the main mass is firm and hard. When the necrosis is extensive and the growth breaks down, it still retains its structure, and microscopic examination shows the characteristic arrangement of a fibroid.

Abortion, when incomplete, the hemorrhage, the dilated cervix, and the recognition of a tumor in the canal may give rise to the suspicion of submucous polypus. The history of a softened but enlarged uterus, and the friable structure of the retained material, disclose the character.

Subinvolution with Endometritis.—The size and rigidity of the uterine body, and the prolonged, often irregular bleeding, may make the determination of the presence or absence of a growth difficult. Whenever hemorrhage is a symptom and the practice of bimanual palpation, without or with anesthesia, fails to reveal its cause, exploration of the uterine cavity should be practised. Such exploration is most effectually accomplished with the finger, after dilatation with laminaria tents. Growths encroaching upon the wall are thus disclosed, and their relation to the uterine wall, whether sessile or pedunculated, is accurately revealed.

507. **Subperitoneal growths** (also called subserous, excentric, or extramural) are generally spheric or ovoid masses springing from the external surface by a more or less distinctly marked pedicle. Like the submucous, these growths are sessile or pedunculated. While the latter class are polypi, that term is more generally applied to intra-uterine growths.

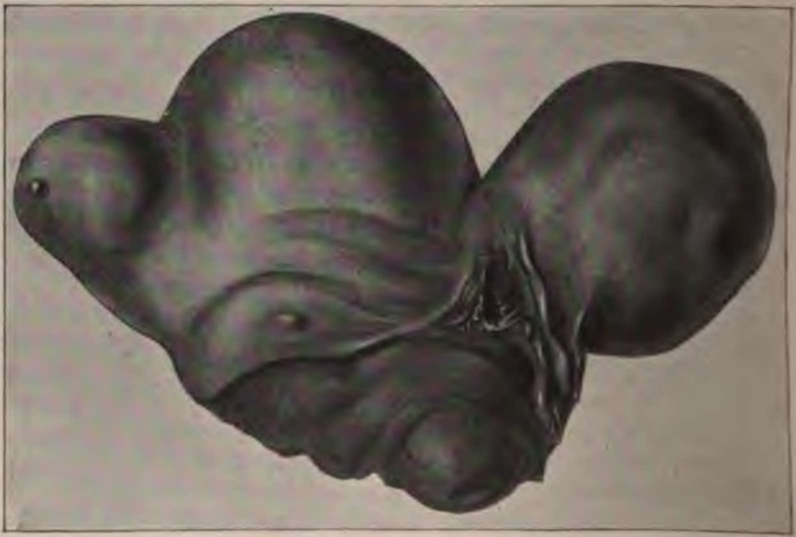

Fig. 443.—Subserous Myomata.

The surface of the growth may be smooth or irregular, according to the contraction of the connective tissue. A division into free and encapsulated is made: the former covered by the serous layer, which is closely attached, without capsule, to the surface of the tumor; the latter, or encapsulated, are covered with a layer of muscle-wall beneath the peritoneum.

The free are hard and only attain a small size; the encapsulated are soft and often become enormous. The pedicle of the tumor varies in length and thickness. It may be short, thick, and permit but little movement between the tumor and the uterus, or long and attenuated, affording such marked freedom as to cause doubt whether the growth is connected with the uterus. The pedicle can sometimes become so twisted as to cut off the circulation of the tumor and lead to its loss of vitality, the development of gangrene, and subsequently to septicemia or peritonitis; or the tumor, in more fortunate cases, may become adherent to the surrounding viscera and lose its association with the uterus. Such a growth is nourished by its adhesions. Not infrequently a very movable tumor causes ascites, and thus simulates a malignant growth.

Nerves and Vessels.—Pressure upon the large vessels interferes with the return circulation from the lower extremities and produces enlargement of the superficial veins in compensation for the obstructed abdominal vessels.

Pressure upon the ureters results in dilatation of these ducts, hydronephrosis, dilatation of the pelvis of the kidney, not infrequently in sacculation of the kidneys with destruction of the secreting tissue, the formation of renal calculi, and suppurative changes. Patients who have had fibroid tumors of large size, of long duration, should be subjected to careful examination of the renal secretion before operative interference. Interference with the cardiac or renal functions leads to profound anemia and an appearance of cachexia, not infrequently to inflammation of the veins of the lower extremities, phlegmasia, the washing-off of particles of coagulated tissue, and the formation of pulmonary emboli.

The growth causes more or less displacement of the uterus, according to its situation; thus, a tumor situated low down in the pelvis grows down into the pelvis, fills it, pushes the uterus above it, which presses against the bladder, and interferes with the evacuation of urine, or causes frequent micturition because of the inability of the bladder to distend. Not infrequently one of the first symptoms of such a growth will be inability of the patient to evacuate the urine, marked retention, painful urination, or apparent inflammation of the bladder. The pressure upon the rectum causes constipation, retention of gas, and tympanitic abdomen; interference with the circulation in the lower portion of the rectum causes hemorrhoids, itching and burning of the anus, the formation of fissure, and not infrequently not only the veins of the anus, but also those of the vulva, become varicose. Large growths becoming incarcerated in the pelvis cause severe pressure on the surrounding structure, with sloughing and gangrene of the pelvic soft parts. An intraligamentary tumor pushes the uterus to the opposite side. The uterus may be so small compared with the tumor that its situation is with difficulty determined.

508. Diagnosis.—In considering the diagnosis of these growths we divide them into three types: first, when the growth proceeds from the fundus or the anterior wall, grows upward, and, in the progress of development, becomes pedunculated; second, a growth is pushed out through the lateral wall of the uterus, between the folds of the broad ligament, practically splitting the broad ligament, and, as it increases in size, displacing the uterus to the opposite side. The third form is when the tumor grows downward from the posterior wall and is beneath the peritoneum, probably not in contact with it. When the tumor is small, and as yet not pedunculated, it may be difficult to determine by conjoined manipulation from which wall it has originated. This is accomplished either by the introduction of the sound into the uterus or by the dilatation of the uterus and the introduction of the finger, when, with one finger in the uterus, and the hand external, or with a finger in the rectum, we are enabled to determine the relation of the growth to the uterine wall. The relation of the larger growths to the uterus is readily determined by bimanual palpation, which enables us to trace the uterus into the growth. The conditions with which myoma is most likely to be confounded are pregnancy and ovarian cysts. In pregnancy the amenorrhea, the softened cervix, the jug-shaped enlargement of

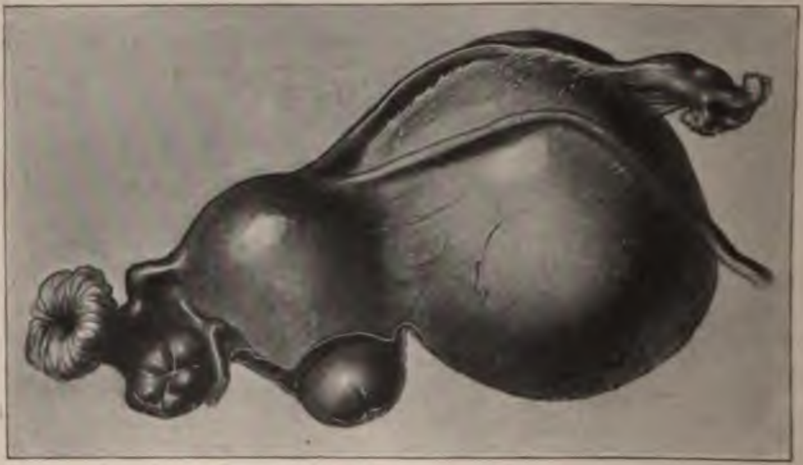

Fig. 444.—Intraligamentary Myoma.

the body, the more or less marked elasticity of the uterus, its regular outline, its indefinite resistance instead of the firm, hard sensation of fibroid, the recognition of the limbs and trunk of the fetus by palpation, the change in the appearance of the mammary glands—these should be sufficient to determine the diagnosis. But fibroid growths sometimes become edematous, and are smooth and regular in outline, rendering it difficult to distinguish them from the enlarged uterus of pregnancy. The long duration of the growth is an important factor. Occasionally, subperitoneal fibroids on the posterior surface of the uterus may be mistaken for the extremities of an intra-uterine fetus. When in doubt, repeated examination should be made, and an anesthetic should be administered.

Ovarian Cyst.—It is frequently difficult to determine the diagnosis between a fibroid tumor which has become edematous and has a long pedicle, and an ovarian cyst of the glandular or dermoid variety. If the cervix is grasped with a double tenaculum, while an assistant, with the hand over the abdomen, draws up the tumor, we are enabled through a rectal examination to ascertain a more exact determination of the relation of the pedicle of the tumor to the uterus. This examination, with the patient under the influence of an anesthetic, will generally be sufficient to determine the diagnosis. It should not be forgotten, however, that the existence of a fibroid tumor does not necessarily preclude the possibility of pregnancy, as we can have pregnancy complicating fibroid growths. I narrowly escaped operating some years ago upon a patient who had a history of having had a very profuse bleeding during the preceding three weeks. The right side of the uterus presented a growth, which was firm and hard, and was recognized as a fibroid. Upon the left side of the abdomen there was more sensation of elasticity or indistinct fluctuation, and it was believed that we had an areolar glandular ovarian growth closely adherent to a fibroid of the uterus. On the day set for the operation, on starting to cleanse the vagina, a foot and leg of a fetus were found projecting from the dilated os, and a partly macerated fetus was delivered. Upon removal of the placenta the uterus contracted and disclosed a pretty good-sized fibroid upon the right side of the uterus. The patient recovered, and with marked decrease of the fibroid growth during the progress of involution, rendering operation for its removal unnecessary.

509. **Interstitial, mural, or centric fibroid growths** develop in the parenchyma of the uterus, frequently attain to enormous size, and involve the entire structure of the uterus, when they are then known as the diffuse or the gigantic fibroid. A second

variety is the circumscribed general form; the third, the local interstitial fibroid. In the general circumscribed variety, as described by Schroeder, the wall of the uterus may be filled by a large number of growths. In the localized fibroma a single or two or three interstitial fibromata may be found. These growths are situated in the wall of the organ, surrounded by muscle-fibers and the loose connective-tissue capsule, from which they can be readily enucleated. In the diffuse form the entire structure of the uterus seems to be taken up in the growth, and it is difficult to fix a sharp border of limitation between the growth and the uterine wall. These growths, when they attain a large size, not infrequently draw out the lower portion of the uterus as a pedicle, which may be attenuated to the thickness of the finger, and twisted, as seen in one case by Kuster, where, in the twist, the torsion was two and one-half times. The cervical canal had been obliterated. Occasionally, the uterine body is found separated from the cervix. The muscular structure of the uterus itself undergoes hypertrophy in these cases, particularly when

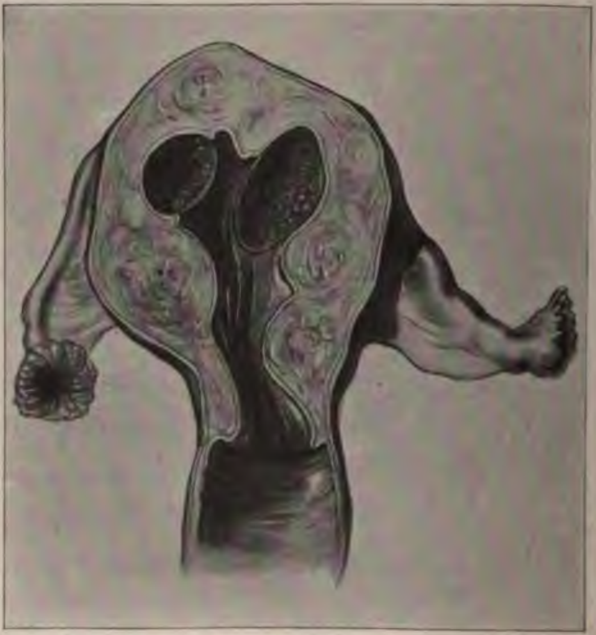

Fig. 445.—Circumscribed Interstitial Myomata.

but few growths occupy the wall. The uterine wall becomes thickened, its cavity is increased, and the cavity undergoes various changes in its shape and size, according to the development of the tumor and its projection into it. The influence of the growth upon the endometrium is most marked. In a large interstitial myoma it may become strongly distended, not infrequently thin and atrophied. In other cases there is a hypertrophy of the entire mucous membrane, occasionally only of the glands; in others, the interstitial tissue between them is increased. Occasionally, the condition is complicated by malignant edema.

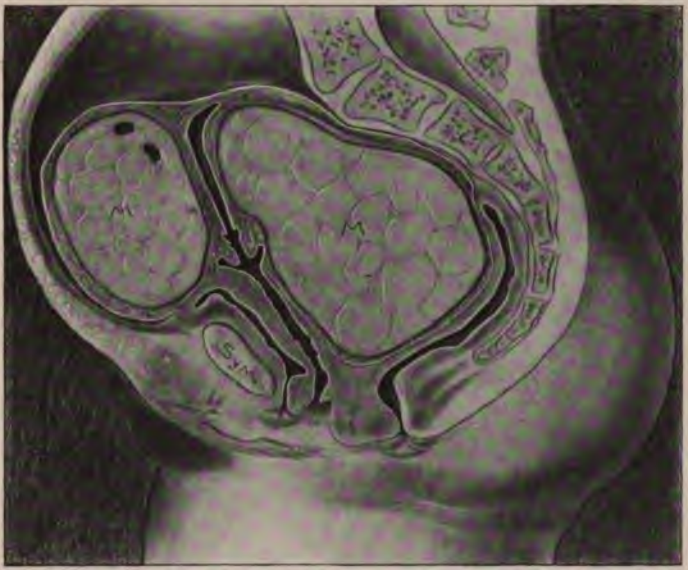

Fig. 446.—Voluminous Myomata Occupying Anterior and Posterior Walls.

In the great majority of cases hypertrophy of the mucous membrane is found associated with these growths.

Symptoms.—The interstitial myoma possesses the symptoms of both the other varieties of growths. The engorgement of the mucous membrane leads to its degeneration, and hemorrhage becomes a marked symptom. The hemorrhage may be an increase of the menstrual flow (menorrhagia) or irregular bleeding may result. Interference with the circulation and hypertrophy of the glandular tissue lead to profuse secretion, which may be simply glandular in character, mixed with desquamated epithelium, presence of pus-cells, or stained with blood, according to the degenerative processes present. The increase in size of the tumor causes the same character of symptoms from pressure that are incident to the subperitoneal variety.

510. Fibromyoma of the Cervix.—Cervical myomata, like those of the uterine body, are submucous, interstitial, and subserous. These growths more than likely originate in the body of the organ, and, by the process of enucleation through contraction, are driven downward, either through the cervical canal or into its structure by splitting it externally. They may be either pedunculated or sessile, and rarely attain a size larger than a goose-egg, although they may completely fill the pelvis. They cause contraction and prolapse of the uterus, and simulate inversion of the organ. They may be divided into two classes:

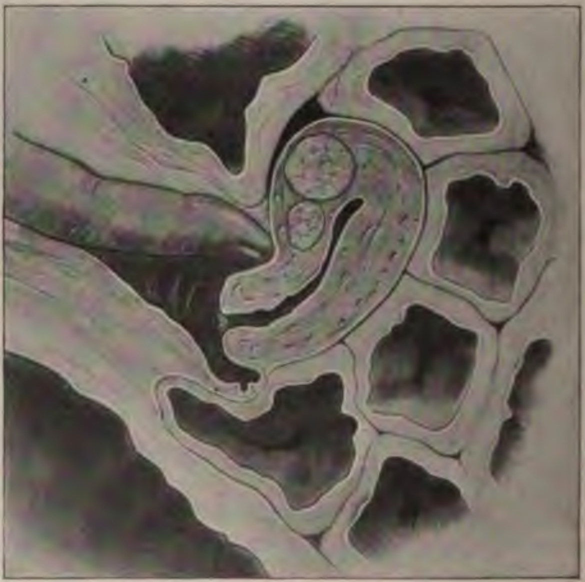

Fig. 447.—Local Interstitial Myomata.

(*A*) Those of the external os, in which the tumor is formed by a cylindric or elongated lip in the interstitial variety. The submucous growths of the cervical canal are occasionally polypoid, which, like slender stalactites, descend through the cervix by the splitting process.

(*B*) Tumors from the subvaginal portion. These are more important when developed from the external surface and situated between the layers of the pelvic floor. They become intraligamentary and exceedingly dangerous by pressure upon the ureter or upon the pelvic vessels; also when posteriorly they press upon the rectum and push the uterus forward and upward. Occasionally, the tumor crowds anteriorly against the bladder, between it and the uterus. Most generally these tumors are found surrounded by a loose capsule, which permits of ready enucleation. Sometimes, however, there is no line of demarcation between the tumor and the uterine structure.

511. Diagnosis.—The tumor presents a mass situated in the vagina, and not infrequently filling it, which is movable, and about which, between it and the vaginal walls, the finger can be passed. Its situation outside the cervix precludes the probability of its undergoing necrosis from pressure. Occasionally, inflammation may be set up in the vagina from pressure, which leads to agglutination between the surface of the tumor and the vaginal wall. Bimanual palpation, with traction upon the tumor, permits of its recognition. The conditions with which it may be confounded are prolapsus of the uterus and inversion. From prolapsus it is differentiated by the large size of the projecting

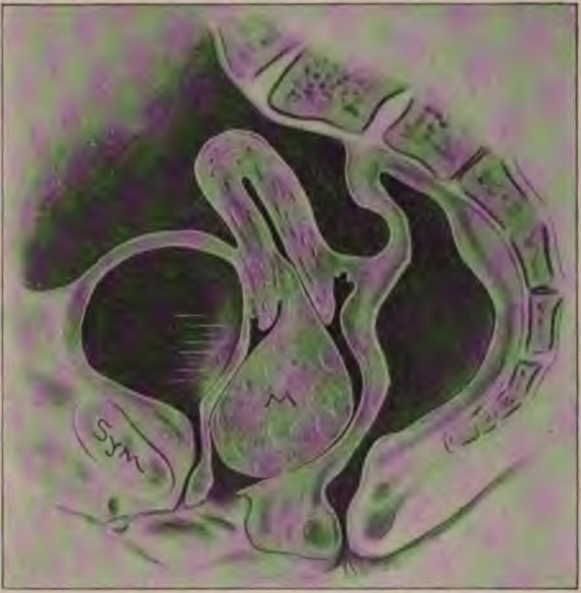

Fig. 448.—Pedunculated Myoma of the Cervix.

portion, with a narrowed neck or pedicle, which can be traced directly to one lip of the uterus or into the cervical canal; from inversion, by dragging upon the tumor and by bimanual palpation, either through the vagina or, preferably, through the rectum. The presence of the body above, with a tumor projecting by a pedicle from the neck, or attached to one lip, admits of the recognition of its true character. The sound may be used, but the diagnosis should be accomplished without it.

512. **Alterations and Degenerations.**—During the active progress of the growth it becomes larger, swollen, and more edematous as each menstrual period approaches; and, following the flow, it decreases in size and becomes more firm and resistant. In the submucous and interstitial varieties cessation of the menstrual function or the establishment of the climacteric is delayed, so that a woman may continue to bleed for from five to ten years longer than would be required for the establishment of the climacteric in a woman whose uterus was free from disease. With the establishment of the menopause, however, the growth usually diminishes in size, and undergoes a process of atrophy. The growth becomes firm and hard, and its size remains fixed; or it

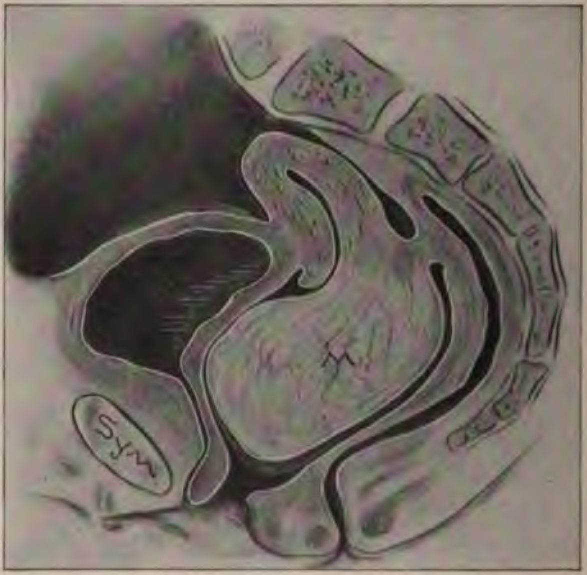

Fig. 449.—Sessile Myoma of the Cervix.

may become soft, and, with this, a process of metabolism follows, by which the growth gradually disappears. In small growths the same length of time after the climacteric the tumor may have almost entirely vanished. These changes also occasionally take place during the progress of a pregnancy or in nonpuerperal cases without our being able to assign a cause. Not infrequently a patient has been alarmed at the discovery, through examination, of the presence of a fibroid growth, and some months or years later another investigation reveals no indication of its existence. If the second investigation has been made by another physician, he may be inclined to believe that a misrepresentation had been made, and yet do an injustice in giving expression to such a suspicion.

Edema (Hematoma).—Edema of large fibroids, especially of the interstitial variety, is not infrequent. The condition is caused by constriction or torsion of the pedicle, through which the venous circulation is obstructed, while the arteries continue to pump in the blood. The interstices of the tumor become filled with serous fluid, so that the entire growth causes a sensation of indistinct fluctuation or elasticity, so marked that only the continuation of the growth with the cervix is sufficient to differentiate it from an areolar glandular ovarian cyst. After the removal of such a growth an incision into its wall will permit the discharge of a large quantity of serous fluid. I once removed such a growth, when a prominent surgeon examining it asserted that it was a fibrocystic tumor. An incision through the structure, however, failed to reveal a single cyst, while nearly a gallon of fluid drained out of the growth in the next two hours following its removal and incision.

Fibrocystic tumors result from dilatation of the lymph-spaces in the tumor or degeneration of a portion of its structure, the formation of a cavity, or, in rare cases, separation of the structure of the tumor in edema.

Calcification.—With the maturity of the tumor, and especially the interference with the circulation, the calcareous salts of the blood are deposited in the wall of the tumor, and cause a calcareous mass, or, at least, a shell, which envelops it. In the examination of such a case the sensation of pressure against bone renders it much harder and more resistant than the ordinary mature fibroid. Not infrequently plates of bone will be felt to break beneath the palpating finger. Undoubtedly, they are similar cases which have given rise to the reported expulsion of uterine calculi.

A submucous or interstitial fibroid having undergone such a change, the subsequent contractions of the uterus cause its expulgrate, slough, and be expelled into the vagina through the cervix as a large sloughing mass, or may produce such marked symptoms from putrid infection that the life of the patient will be sacrificed notwithstanding operative interference for its removal. Such conditions are readily confounded with malignant disease. But recently I was called to see a patient who had been examined by a physician who assured her family that she was suffering from an incurable malignant growth, which must speedily terminate her life. The history of profuse hemorrhage and of an exceedingly offensive discharge, and the appearance of profound anemia and a condition resembling cachexia, afforded apparent confirmation of the correctness of his suspicion. The finger disclosed a large mass filling the vagina, which, instead of being soft and friable, as a cauliflower growth would be, was roughened on its inferior, but smooth upon its upper, surface, was quite movable, and a distinct pedicle could be recognized, which projected from the cervical canal. The neck of the uterus was thin, pliable, and without any infiltrate, which demonstrated that the diagnosis of malignant disease was incorrect, and that the patient was suffering from a sloughing fibroid polypus. In cases of doubt the history, more or less firmness of the growth, the distinct arrangement of the structure, even when gangrenous, and the absence of any cellular infiltrate are sufficient to afford a correct diagnosis. An abscess may develop either in the wall or within the growth itself.

Malignant Degeneration.—Cancerous degeneration of a fibroid growth has not been demonstrated. The presence of the growth renders the uterus less resistant and facilitates the probability of malignant degeneration of the endometrium. The most frequent malignant degeneration, however, is the infiltration of the fibroid growth by sarcomatous processes.

513. Mixed Growths.—Enchondroma, Sarcoma, Osteoma, and Carcinoma.—The origin of these growths is uncertain. It is possible that they must originate in one of two ways—either in transformation of the cells which produce other tissue species, or in an invasion in which the growth is penetrated by the neighboring proliferating masses. Thus, we have myochondroma, myosarcoma, and myocarcinoma. The first of these is very rare. The second is more firm, and grows rapidly from a small invasion. The normal filamentous structure of the fibroid growth is soon lost in a homogeneous mass, which rapidly becomes necrotic; the tumor then forms a mere thick shell. With the necrosis of the mass, not infrequently vessels are eroded, and extensive hemorrhage may take place into the cavity. The disease is not confined to the growth, but invades the surrounding healthy tissues. The enveloping cells are large, irregular, rich in chromatin, and contain several nuciei. Sanger asserts that all myomatous growths containing irritation cells (myoklasken) are sarcomatous.

Myocarcinoma arises from carcinomatous alteration of the surface of the polypus, or by development from the glandular constituents of an infiltrated adenomyoma.

514. **Etiology.**—The causes of fibroid tumors are unknown. Recklinghausen attributed their origin to embryonic tissue, the remains of the Wolffian bodies. The irritation which characterizes fibromata is not a physiologic irritation like that of pregnancy, but a diseased impetus. It is an unusual kind of local irritation, associated with a weak or debilitated condition of the concerned spot. This introduces Cohnheim's view of tumor origin, which was that the local irritation was brought to development by the presence of tumor germs. The influence of sexual irritation is appreciated, in that statistics demonstrate that in the majority of cases the first indications appear during the second half of the third decad: *i. e.*, between the twentieth and thirtieth years. The tumor forms in the first half of the fourth decad, shortly after the thirtieth year. These growths rarely develop before or after these periods, although Biegel is reported to have seen one in a girl ten years of age, and Leopold the beginning of a myoma in a child. There has been much discussion as to the influence of the married or single state upon the development of these growths. Hofmeier says that the number of births does not stand in any relation to the causal formation of the growth, while Winckel believes that the married are more predisposed, and that the myomatous formation decreases the number of births. Shoemacher, on the contrary, asserted that the unmarried are more frequently so diseased. Hofmeier accounts for the relatively large number of unmarried women who suffer from myomata by the explanation that the tumor formation is one of the few causes which lead them to consult the gynecologist. Prowchownik gives syphilitic infection as a cause, but the growths occur so frequently in individuals in whom there has been no possibility of such infection as to render this view of little value. Olshausen and Gusserow assigned local irritation as the etiologic factor. Shoemacher looks upon menstrual congestion as a cause, but to give these reasons for the development of the disease is equivalent to giving none, as it is necessary to seek further for the cause of the irritation. The cause is sometimes considered as congenital or acquired. The influence of heredity, as to whether there is a predisposition to the development of such growths in families, may be questioned. Heredity seems to be manifested in the greater apparent and comparative susceptibility

of the colored race to the development of fibroid growths. It is not unusual to find several members of one family suffering from myomata. Among the various causes it is probable that sexual irritation should have the first place, and this irritation may have been engendered without the uterus having undergone the changes incident to pregnancy and labor. The abnormal irritation may be the result of masturbation, of psychic disturbances, of such unnatural processes as the evasion of maternity, of the psychic phenomena engendered by body-contact with man, of sexual agitation, and of other factors which may produce repeated injurious influence. It is quite possible that defective development or an abnormal position of the uterus may exert a marked influence in the development of these growths. It still remains evident, however, that in any individual myoma we can not positively assign a cause which can be considered a definite reason for its development.

515. Complications.—The study of the progress of fibroid growth from its origin in the wall of the uterus to its subsequent extrusion, and the changes and lesions to which it may be readily subjected, will afford reasonable explanation for many complications which are associated with it and influence the progress of the growth. Of these complications, the most important, because one of the most frequent, is that of inflammation and the resulting adhesions.

1. Inflammation, as we have already seen, may involve the structure of the growth or may influence only its superficial surface. The structure of the growth can undergo inflammation from decreased nutrition by its extrusion into the peritoneal cavity, when it becomes a foreign body, which nature, in its efforts to protect the general structure, surrounds with plastic material, from which the tumor may receive additional and necessary nutrition, and which fixes it in relation to the structures immediately about it. Such adhesions may take place with the intestine, the mesentery, or the abdominal wall, and may lead, through traction upon the tumor, to still further thinning or attenuation of its pedicle, and, finally, to separation from the body of the organ, so that occasionally such growths are found removed from the original attachment and nourished through the inflammatory adhesions. The causes for inflammatory changes may be divided into (1) those incident to alterations in the tumor; (2) to irritation-changes in the peritoneum from the presence of the growth as a foreign body; (3) to infection. Infection may arise from disease of the appendix, the Fallopian tubes, or through direct transmission from the intestinal cavity.

2. Ascites.—A second, though less frequent, complication of the myoma is ascites. This is likely to take place in the irritation of the peritoneum from pedunculated subperitoneal growths. It may possibly be engendered by want of vitality in the growth itself, which makes it a foreign body and leads to irritation, which results in ascites. Ascites is much more frequent in malignant than in benign growths, and its presence should always lead to a certain amount of suspicion as to the probable changes that have taken place in the growth.

3. Disease of the Tubes.—Some disease of the Fallopian tubes as a complication of the presence of fibroid tumors is very common. It may be a simple hydrosalpinx or a pyosalpinx. Adhesions may be extensive, and very greatly complicate any operative procedure. The most frequent cause of this condition is undoubtedly the result of infection which has traveled through the uterus. The presence of the fibroid growths favors the congestion of the pelvis, and makes the tubal mucous membrane a more favorable soil. Pressure of the growth upon a Fallopian tube may interfere with its circulation, cause a distention of its cavity and the formation of a tubal collection. This defective drainage causes regurgitation into the pelvic peritoneum from the abdominal end of the tube, which sets up a peritoneal inflammation, and produces a gluing up of the tube and the formation of a hydrosalpinx or pyosalpinx, according to the exposure or absence of infection.

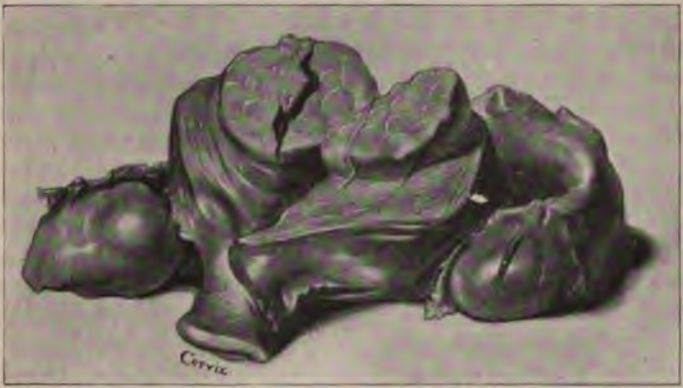

Fig. 452.—Myoma Uteri Complicated by Pyosalpinx.

4. Ovarian Cysts.—The existence of fibroid tumors does not necessarily increase the tendency to ovarian growths, nor does their presence preclude the development of cysts in the ovary.

The presence of an ovarian cyst with its rapid development may greatly increase the distress of a patient who is suffering from a large fibroid tumor, and may necessitate earlier resort to the physician for relief. In very large ovarian cysts a fibroid growth may frequently be overlooked, and detected only when the patient is subjected to operative interference.

5. *Pregnancy.*—The presence of fibroid growths increases the tendency to sterility, but does not necessarily preclude the existence of pregnancy. Recognition of the existence of pregnancy is of the very greatest importance, as the progress of the condition may have a marked influence upon the rapidity of the growth, while the growth may favor the premature interruption of the progress of pregnancy. This complication is of so much importance that it may be studied from various standpoints.

516. (*a*) **The Influence of the Myoma upon Conception.**—It can be readily understood that the presence of a fibroid growth—for instance, of the polypoid or submucous character—renders the mucous membrane of the uterus unprepared for the retention of the fecundated ovum, and not infrequently the removal of a polypus from a woman who has been sterile for a number of years is very shortly followed by conception, even though years of sterility had preceded.

517. (*b*) **Influence of Pregnancy upon the Myoma.**—The increased congestion of the uterus incident to pregnancy causes greater nutrition of the growth, results not infrequently in its rapid increase in size, and the growth which was situated in the pelvis is of itself raised out of it, and forms a more and more large mass. In some cases the growth is slow, adhesions may hold the uterus down so that it can not rise out of the pelvis, and we may have as a result an impaction of a mass in the pelvis similar to that which occurs in the gravid retroflexed uterus. Sometimes the rise of the growth in the pelvis may be rapid, or it may be situated low in the pelvis, and not emerge from it until between the sixth and seventh months. Intraligamentary growths become altered by the pressure and cause a great deal of distress. The fibroid polypus or submucous tumor is sometimes extruded into the vagina, from whence it may be removed without any indication of interference with the pregnancy. Marked changes in the size, form, and consistence of the uterine growth may be noticed. The increase in size is often due to edema. Venous engorgement frequently occurs as a result of obstruction of the veins, while the blood is continually poured into the structure by the less readily controlled arteries. Where a number of fibroid growths are situated together in the pelvis they not infrequently become nonpedunculated subserous growths, and often become flattened from pressure. The circulation can be obstructed to such a degree as to result in necrotic changes. Such changes require early and prompt interference in order to save the life of the patient.

518. (*c*) **The Influence of the Myoma upon Pregnancy.**—An intra-uterine growth, covered as it is by mucous membrane, predisposes the subject to increased bleeding. This hemorrhage and the changes in the uterine mucous membrane may be so marked as to result in premature interruption of pregnancy; or the ovum may be lodged low in the uterine cavity, causing the formation of the placenta over the cervix,—what is known as placenta prævia,—in which the life of the mother will become more endangered as the pregnancy progresses. The situation of the tumor may favor retroversion of the gravid uterus and its impaction in the pelvis, or the tumor itself may be impacted with the development of the pregnancy. The presence of a fibroid growth, with its pressure upon the tubes, may cause the development of a tubal pregnancy, which may remain unsuspected until its rupture into the abdominal cavity occurs, with the accompanying peril to the patient.

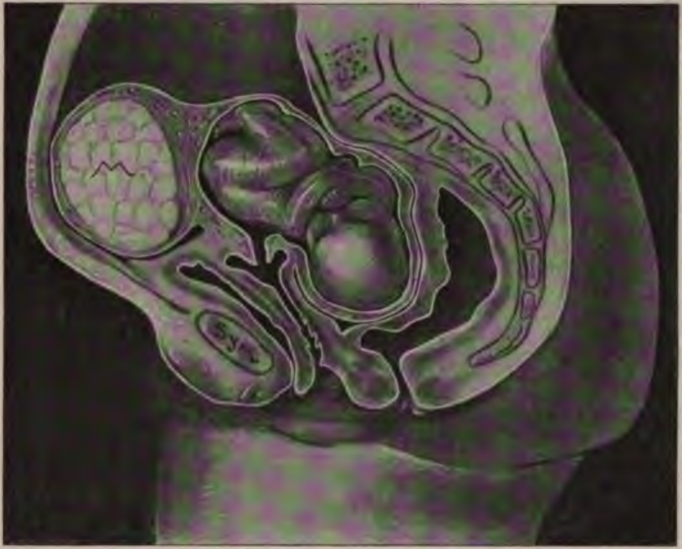

Fig. 453.—Myoma Complicated by Pregnancy.

519. (*d*) **Influence of Labor.**—In the majority of small

fibroid growths, especially those which have not attained to a size larger than a walnut or an orange, the presence of the growth produces but slight, if any, influence upon the progress of the labor. Tumors of a larger size, which are situated in the pelvis, may interfere with labor and require operative interference for their previous removal. Occasionally, with changed position of the patient and elevation of the hips, the tumor may be pressed out of the pelvis, or a tumor situated so low in the pelvis under the dilatation of the os and elevation of the cervix as the dilatation progresses, may be lifted out of the pelvis. Large subserous growths, when above the pelvis, in or near the fundus of the uterus, exert no influence upon the progress of the labor. Cervical growths, however, are very important, as from their situation they may occupy a position below the level of the cervix, and necessarily interfere with the delivery of the fetus, but even when the growth is thus found in the pelvis it is often spontaneously raised as the process of dilatation proceeds. Submucous growths may be extruded into the vagina previous to the inception of labor and then be removed. If the tumor becomes edematous, it is more compressible and less of an obstacle to the progress of delivery.

520. (*e*) **Diagnosis of Complications of Myoma and Pregnancy.**—Small subperitoneal fibromata are usually readily determined by palpation, In large growths during early pregnancy the diagnosis is difficult. We may be able to determine the presence of growths, but unable to appreciate the existence of pregnancy. In all varieties the condition is obscure. The condition may be suspected when associated with absent menstruation and the beginning softening of a portion of the uterus as compared with the hard fibroids springing from its surface. The first consideration in determination of the condition is palpation, when we will notice the soft, spheric tumor associated with the hard myoma, or, when a number of growths are present, softened spots between these growths. The diagnosis may be more readily determined under the influence of an anesthetic. In the consideration of the condition three symptoms should be kept in mind: (1) the softness of the vaginal portion of the cervix; (2) the blood-red color or dark, dusky appearance of the vaginal wall; (3) absence of menstruation. The occurrence of profuse bleeding for some time and subsequent amenorrhea will not infrequently cause the existence of pregnancy to be overlooked. When pregnancy is recognized, as the condition progresses, the tumor increases with the growth of the uterus, and becomes more or less soft, we may very readily suspect a twin pregnancy exists, especially if no information is derived of the existence of a fibroid growth. The difference in resistance in the structure of the uterus will generally be sufficient to afford an idea as to the presence or absence of pregnancy.

521. Course and Prognosis.—Many of these growths, especially when small, produce very few symptoms, and those quite vague. Others cause serious disturbance until the occurrence of the menopause, after which the great majority of tumors undergo atrophy and diminish by induration during the process of involution. This process of atrophy is occasionally hastened by pregnancy, so that patients who have been recognized as suffering from a fibroid growth have the tumor entirely disappear by the

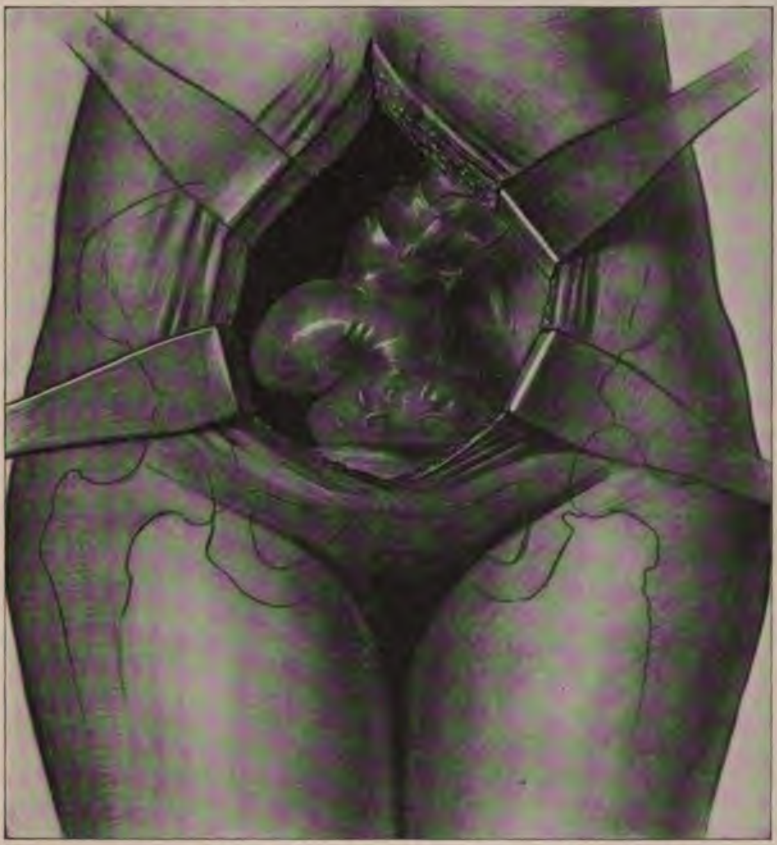

Fig. 454.—A Myoma Which, from the Associated Ascites, Had Been Mistaken for Pregnancy.

completion of the pregnancy; or, in other cases, during the subsequent convalescence. Occasionally, there is a marked breaking-down of the health, associated with fibrous cysts or fibromyomata, and particularly after the critical age. The tumors that remain quiescent are not necessarily small, but can reach to the level of the navel, so that the patient may be entirely ignorant of their presence and only be made aware of the existence of the growth by an examination that is made for some intercurrent condition, or for the treatment of symptoms produced by the tumor, of the cause of which the patient had previously been in ignorance. In the majority of cases the tumor does not threaten life either directly or indirectly. In this respect these growths are quite different from carcinoma or an ovarian tumor. The carcinoma demands immediate operation, as soon as discovered, for life is destroyed by its progress; but in myomata such advice must be modified, for in many cases the growth is not even the cause of the disease for which the aid of the physician is sought. In

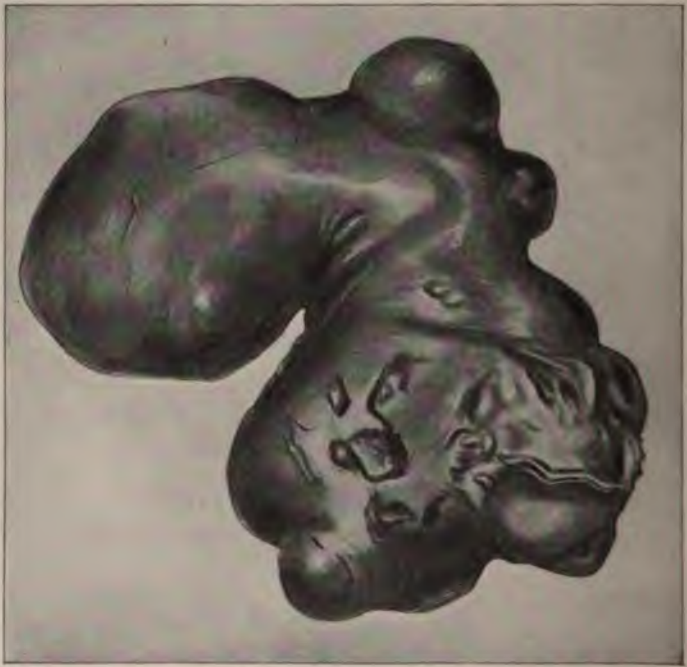

Fig. 455.—Tumor Shown after Removal.

others it may be productive of disturbance. In myomata of large size, which reach above the umbilicus in young individuals, the prognosis as to time is good, but there are possibilities of it becoming worse. In a woman who has not reached the age of thirty-five years, and a tumor attains a size corresponding to that of a pregnancy at full term, one can with security assert that the life of the individual is threatened, and the capacity for suffering must be limited. Attention should be directed to the symptoms that threaten life. The operation in such cases is no longer elective, but necessary, as the percentage of danger from the operation is more trifling than from the unfavorable influence produced by the growth of the tumor. In such cases, in order to produce conviction we should be able to assert that the operation is advisable, and can not be postponed for ten or twenty years with the hope that the patient will still manifest good powers of resistance and a fair chance for recovery. If the tumor comes under observation at a later date, near the middle of the fifth decad,—about forty-three to forty-five years of age,—we must be governed by the symptoms. It is possible that the tumor may swell during menstruation, and that after its final cessation a more secure and much more considerable diminution appears. In such cases we can wait until symptoms appear. In all cases the prognosis is dependent upon the age and its relation to the tumor. Great size of the tumor and its complex symptoms affect the future course. All complications that increase the size of the tumor render the prognosis the worse, the younger the age of the patient. In these cases we have to determine that not the tumor but the complications are the cause. Complications that may be regarded as hazardous in the young are less serious in the older, because the longer duration of the disease renders the organism more accustomed to its existence. The prognosis is very bad in cases of severe heart affections, as fatty degeneration, though this is difficult to recognize in the living. Other complications may render the prognosis of the myomata bad, but not necessarily make the prognosis of operation worse. The first indication of heart affection should be regarded as an indication for prompt operation. The prognosis is rendered much worse if the myoma has undergone a malignant degeneration, which, however, is rare. The rapid growth of the tumor is not necessarily an indication of malignant change, but more of cystic degeneration, which renders the prognosis of the further continuation of the growth worse, approaching in this respect the ovarian condition. The prognosis of all small tumors, especially those which cause more or less hemorrhage, is not necessarily unfavorable. The danger is never so great as it appears to the patient. The discomfort produced by the condition and the anxiety about further duration and increase of bleeding impel the patient to consult her physician. In such cases it is difficult to arrive at a correct judgment, as the patients do not appreciate the fact that life is not necessarily threatened when menorrhagia is profuse. In the consideration of methods of treatment we must keep in mind the fact that the productive activity is injured, even though a bad prognosis is not to be asserted. The danger lies in the long duration of hemorrhage, which thereby renders worse the general condition. The prognosis is more grave when there is more marked general disturbance. In many cases the appearance of hemorrhage can be regarded as a favorable indication, as it proves that the spontaneous discharge of the tumor is taking place, following which the prognosis is improved.

While it is true that a fibroid growth usually undergoes an abatement of its symptoms with the advent of the menopause, yet it should not be forgotten that the existence of such a growth generally delays the climacteric beyond the ordinary period of life at which it should occur. Occasionally, the natural evolution of a tumor, which results in its conversion into an extraperitoneal or intraperitoneal growth, may cause rupture of its pedicle, from the weight of the tumor alone or from thinning of the pedicle. By straining in defecation or in vomiting, a polypus may be expelled. The rupture of a pedicle may limit the subsequent progress of the growth, or it may remain grafted to the point where it has formed adhesions and be subsequently nourished, or it may lie free in the peritoneum and undergo mummification. A more serious spontaneous extrusion is mortification or gangrene of a tumor which has been expelled toward the uterine cavity. Perforation of some of the neighboring organs may occur, as, the bladder, the rectum, the rectovaginal pouch, or the abdominal wall. The two former conditions end in death; the latter, in possible recovery; or, finally, the tumor may be absorbed. Causes of death are profound anemia from repeated hemorrhage; successive attacks of chronic peritonitis; disease of the kidneys; uremia and heart failure; rupture of cyst; or inflammation and gangrene. Sudden death has been observed as a result of embolism. Exploratory puncture favors the production of thrombi in the large venous sinuses. Death from shock after intravenous rupture has been reported. In very small growths which have been extruded beneath the peritoneum, and by their relations show no evidence of taking on growth, it is preferable that the patient should be left unaware of their existence. The various complications to which these growths are subject; the alterations which they may undergo during their progress; the influence upon the health of the individual from pressure upon important viscera; the danger from separation of growths and subsequent gangrene; the possibility of their continued nutrition and growth subsequent to the menopause; and the occasional malignant degeneration of the mass, associated with the diminished mortality by early operative procedure, particularly that of hysterectomy, would render it advisable that the extirpation of the growth should be practised.

522. **Treatment.**—The mere discovery of the existence of a myoma must not be considered as a necessary indication for its removal, or even treatment. In this respect myomatous tumors differ from ovarian growths and from cancer, for the latter must be removed early, because their continued existence results in destructive influences upon the organism. The myoma must cause symptoms in order to indicate interposition. The external relations of the patient must play a great rôle in the method of treatment—the capacity of resistance, the ability to undergo rest during menstruation, and to avoid severe bodily labor; consequently the treatment is different in the working class, who can not rest, from that which must be practised in those who are able to take care of themselves. There are some cases in whom hygienic and dietetic rules must govern. Neither the growth of the tumor nor the strength of the hemorrhage will necessarily be influenced by the methods of treatment; but by the avoidance of severe bodily effort and the promotion of nutrition disturbance of the health equilibrium is avoided.

The patient should be directed to be careful of her dress, and not to shove down into the lower part of the pelvis the uterus containing a fibroid by wearing a tight corset. Every constriction of the belly wall over the tumor should be avoided. In some cases, when the abdominal wall has become weakened by previous distention or the climacteric has occurred, the comfort of the patient may be greatly enhanced by wearing a binder or support, which will prevent the organ from falling forward. In such cases, and in growths which will promote the occurrence of torsion, a radical operation is indicated. Schroeder attempted in very movable tumors to fasten them up by sutures passed through the abdominal wall, but this plan of treatment is unsatisfactory. The very profuse hemorrhage which frequently occurs requires that the nutrition should be kept up and that all excesses in Bacchus and venery should be avoided. Near or during the menstrual period the patient should be kept quiet, and an ice bladder or cold applications should be placed over the abdomen. Tea and coffee should be discontinued, because experience has demonstrated that both these articles increase the tendency to profuse bleeding. Various baths and springs have been advocated as efficacious; among these the Kreuznach, Tolz, and Halle in upper Austria, which are largely impregnated with iodin and bromin, and the Franzenspad and Elster, in which sulphur is an important element. These waters probably exert their influence not so much upon the tumor as upon the improvement of general nutrition. The health is built up, complete rest is secured, and the relief is obtained through this and the improvement of the appetite.

523. **The treatment** may be divided into: (*a*) medical; (*b*) electric; (*c*) surgical.

524. (*a*) **Medical treatment** consists in the general nutrition of the patient and in the amelioration of unpleasant symptoms, and, consequently, is largely symptomatic. The agents which have most influence upon the progress of the growth are those which produce an effect upon the muscular coat of the organ, and are what are known as the oxytoxics, of which ergot is the principal. Ergot may be given by the stomach, by the rectum, or through hypodermic injections. Its use by the stomach causes more or less disturbance of the digestive tract, nausea, and vomiting, and in order to exert an influence it must be continued over a long period of time, which renders this method of administration objectionable. For temporary effect, however, ergot, in combination with a vegetable astringent, will exert a favorable influence in decreasing and cutting short a hemorrhage. The following prescription may be useful:

℞. Ext. ergot., ... f℥ j
Ext. hamamelis,
Tinct. cinnamom., ... āā f℥ ss. M.
SIG.—f ʒ j every two or three hours.

When the patient suffers from the expulsive efforts of the uterus, they may be ameliorated by the addition of ¼ of a grain of the extract of cannabis indica. Ergot is best administered by hypodermic injection of the sterilized fluid extract, the normal liquid, or ergotin. The agent should be thoroughly aseptic, should be injected in close proximity to the tumor, preferably in the abdominal walls, and the precaution should be taken to make the injections deeply into the muscle, as they will then be less likely to cause subsequent abscesses. Ergot acts in two ways: it stimulates the muscular coats of the blood-vessels and the involuntary muscle-fiber of the uterus, thus cutting off the supply of blood sent into the organ; and, secondly, by increased activity of the muscular structure, fibroid growths which are situated in the wall are rapidly expelled, either intraperitoneally or extraperitoneally.

The retrogressive processes which fibroid growths naturally undergo, sometimes leading to their entire disappearance, have induced faith in the efficacy of a great variety of remedies, as any remedy which was administered at the time the tumor was undergoing this process is given credit for the beneficial change. Among agents that are considered to have a beneficial effect are the potash and ammonia salts, particularly the bromids, the iodids, and the chlorid of ammonium. How much influence, however, these drugs have upon the progress of the disease is an undetermined question. Among other drugs that have been used are sulphuric and gallic acids, turpentine, cannabis indica, extract of hamamelis, and extract of hydrastis canadensis, and the active principles of the latter agent, such as hydrastinin and hydrastin. The latter agents act by constringing the blood-vessels, and have a beneficial influence in the control of hemorrhage. Efforts have been made by cutting off certain articles of food to bring about the burning up or destruction of fibroid growths to compensate for the deprivation. The use of carbohydrates seems to have been in some few cases effective. Sir J. Y. Simpson, recognizing that the calcareous degeneration of the fibroid limited its further growth, proposed to accomplish this by the administration of large doses of chlorid of calcium, but it was found that this drug produced deposits of plates in the aorta and the valves of the heart, and thus produced conditions more grave than that for which it was administered.

Recently much has been claimed for the influence of the extract of the thyroid gland in reducing the size of growths, and particularly in arresting hemorrhage. As patients vary greatly in their susceptibility to the influence of this agent, it must be administered carefully, gradually increasing from a dose of from three to five grains a day to the largest amount the sensibility of the patient will permit. In exophthalmic goiter or in irritable conditions of the heart the drug is borne very badly, even in small doses. In a case in which I employed it for a fibroid growth it produced such an effect upon the nervous system that its use had to be discontinued. Polk and Mann are very pronounced in their expressions of its value. Shober has administered mammary gland extract with apparent benefit in a limited number of cases. The value of these drugs, however, still remains to some degree undetermined. That thyroid extract has an influence upon the uterus and genital organs is evident by its beneficial influence in cases of sterility. Other local means of palliative character are injections into the vagina. They have no influence on hemorrhage from the uterus, more than can take place from the coagulation of the blood in the vagina and the obstruction thus induced.

Ice-water was formerly employed; later, hot water. Both means are efficacious in obstetrics, but they have but little influence in fibroid tumor. The agent must come directly in contact with the endometrium to be of service. When hemorrhage is very marked and uncontrollable, the vagina, or even the uterine cavity, may be packed with iodoform gauze, which acts as a tampon and thus controls the bleeding. When the uterine canal is open, the cavity may be irrigated with hot water or vinegar water, a solution of perchlorid of iron, tincture of iodin, and other agents, with a view to arresting bleeding. These agents are sometimes quite effective in arresting hemorrhage for a length of time, but their use is not unattended with danger. The cavity should be such that the subsequent drainage can be complete; in other words, the cervical canal should be patulous. But even in such cases the method of treatment is not infrequently attended with danger.

I well remember a patient in my early experience who suffered from profuse bleeding from a large fibroid. The cervical cavity was large, and with a uterine syringe I injected tincture of iodin into the cavity. Almost before the syringe could be withdrawn the patient complained of tasting the drug, and within a few moments had a most violent attack of pulmonary edema, which threatened her life, and from which she recovered only after a protracted illness, and then she suffered from mental disturbance. Needless to say, I was not inclined to look upon this plan of treatment subsequently with a great deal of confidence.

525. (*b*) **Electric.**—Electric treatment has been practised in the treatment of fibroid growths for many years. The methods of application of the agent were crude, and not infrequently were attended with great danger, especially when punctures were made through the abdominal wall directly into the tumor by an insulated needle, which thus produced a direct and localized influence upon the structure immediately in contact with the poles. It remained for Apostoli, by his method of measuring the current and fixing the direct dosage, to evolve a plan of treatment which can be practised with a certain degree of precision. Under ordinary means the passage of a current of from five to ten, or at most twenty, milliamperes is attended with considerable discomfort. By his apparatus and method of procedure from 100 to 200 milliamperes are employed. This is accomplished by the application over the external surface of a large, comparatively inactive electrode, while a more active electrode is introduced into the vagina, or, preferably, into the uterine cavity. He further defined the influence of the positive and negative poles. The positive pole was recognized as producing a decomposition of the fluids about

it, which resulted in the accumulation there of an acid, while about the negative pole accumulated alkaline fluid. The former is the more destructive in its influence, and hence is more particularly of value in diseased conditions of the mucous membrane which cause hemorrhage. The application of the positive pole within the uterus causes an electrolytic or cauterizing action, which results in coagulation of the blood in the vessels and in the arrest of bleeding. The negative pole, on the other hand, by its influence produces edematous infiltration of the tissues at some distance from the pole, and the subsequent absorption decreases the size of the growth. For the practice of Apostoli's treatment, then, are required: first, an electric battery sufficiently large to give a current strength of from 200 to 300 milliamperes without its wearing out too rapidly; second, a galvanometer capable of measuring 500 milliamperes; third, a rheostat, by which the strength of the current can be gradually increased. The current chooser—an instrument by which the current can be changed from positive to negative without the removal of electrodes—is important. It must be kept in mind in the use of this instrument, however, that the strength of the current must be very greatly reduced before such a change is made, as otherwise the patient would receive a violent and painful, if not a dangerous, shock.

Electrodes.—The external electrode, to be placed over the abdomen, is of large size, and consists of the clay pad of Apostoli, of the bladder or water electrode, as advocated by Martin, or of a towel wet with a salt solution and over which the electrode is placed. The intra-uterine electrode consists of a probe insulated within a couple inches or more of its point, as may be desired. An ordinary probe with a gutta-percha hood which can be slid over it affords an efficient electrode. The electrodes are placed in position before the current is turned on. The latter is applied gradually, watching the galvanometer and the expression of the patient to ascertain the sensibility. The internal electrode is made of platinum or carbon, these agents having more endurance. As large quantities of strongly acid material accumulate about the electrode, the less durable metals would be very quickly destroyed by electrolytic action. In the application of electricity the vagina should be thoroughly cleaned in order that no infection shall be carried into the uterine cavity. It is recognized that electricity is a powerful antiseptic, but it is only in the stronger doses that it exerts such an influence. The application of electricity may be made two or three times a week, according to the intensity. When strong currents are used, but once a week is preferable. The seance lasts from five to fifteen minutes.

Previous to the application of the external electrode the skin of the abdomen should be carefully examined for breaks in the chorion, by denudation from scratching, or from the presence of furuncles. Any irritated points should be treated, and should be excluded from contact with the electrode by the application of collodion or pieces of plaster to insulate it. The external electrode is placed upon the abdomen and is connected with the battery; the internal electrode, also connected, is introduced, but with the precaution to have the current closed. The current is then opened slowly and carefully, and is gradually increased to the point of tolerance. The current is gradually reduced before the withdrawal of the electrode, to prevent the patient from being subjected to a severe shock. In the beginning of the treatment it is important that the current should be governed with the greatest care, and currents of moderate intensity only employed, until the degree of toleration is determined. It is difficult to fix the number of applications to be required—generally from twenty to thirty.

Electropuncture of the Myoma.—Occasionally, the situation of the tumor may be such as greatly to displace the external os and to render the canal tortuous and difficult for the introduction of the electrode. In such cases puncture may be made into the myoma through the anterior cervical wall. Just as rigid antisepsis should be practised for this procedure as for the most serious operation, and as it is not infrequently quite painful, an anesthetic should be employed. The puncture of the vagina is from one-half to one centimeter deep, and is performed without the employment of a speculum. Previous examination will disclose the position of the uterine artery, which should be avoided; also care should be exercised not to injure the bladder or intestines.

Electricity exerts its influence in three ways:

(*a*) In the diminution of the tumor from one-fifth to one-half of its original size. Complete disappearance is exceedingly rare.

(*b*) In a most marked influence upon the hemorrhage.

(*c*) In the relief of pain.

The disappearance of pain and the arrest of hemorrhage necessarily result in the improvement of the general condition of the patient. Apostoli gives the following contraindications: first, hysteria; second, intestinal catarrh; third, pregnancy; fourth, malignant degeneration of the tumor; fifth, fibrocystic tumors.

Some of his followers do not consider hysteria an absolute contraindication, but Apostoli has made the observation that the hysteric possess a very great intolerance to the electric current, making it impossible during the course of a sitting to introduce a sufficiently high current to bring about favorable results. In intestinal catarrh the current has a strong influence on the solar plexus, which calls forth severe contraction of the intestinal muscle. It can be readily understood that the presence of malignant growths must necessarily offer a direct contraindication to the electric treatment. The diagnosis is sometimes difficult to determine. Kellogg has asserted that in a myoma which after the menopause shows a rapid growth malignant degeneration is undoubtedly taking place, and that electric treatment should be withheld. In fibrocystic tumors the gas accumulation after the electric treatment may lead to suppuration. Gehrung, in order to avoid this, employs a puncture cannula, so that the fluid contents of the tumor can be drawn off. The presence of pus in the adnexa, as mentioned by Apostoli, is a very frequent complication, and one often difficult to recognize. The employment of electricity in such cases is unexceptionally harmful. It is unnecessary that the inflammation should have gone on to suppuration in order to make the treatment objectionable. Very acute or subacute inflammation in the environment of the uterus is a positive contraindication to electrotherapeutics.

Further, a very important contraindication for electric treatment depends upon the situation of the tumor and its relation to the uterus, and justifies the following statement:

(*a*) In subserous tumors, particularly when they are pedunculated, electric treatment will have but little beneficial effect, and is likely to prove injurious.

(*b*) A pedunculated submucous fibroid affords no special advantages for electric treatment.

In an inconsiderable number of cases suppuration of a polypus has resulted from intra-uterine electric treatment. Not infrequently has a fatal result appeared, or total extirpation of the suppurating organ been performed, with or without favorable result. Other contraindications, in addition to those named, are heart failure and acute nephritis. In very hard tumors the employment of electricity is opposed by Parsons, as they can not be influenced by it.

Colossal Tumors.—In studying the influence of electricity upon the tissues we must take the polar and the interpolar.

1. The Polar Influence.—This incidentally depends on the progress of electrolysis of the soft tissues. In the passage of the current from the metallic body, in fluid destruction which takes place in the salt solution, and about the positive pole an acid is formed, while the metal surrounds the negative. Similar changes occur in the tissues of the body, so that about the positive pole acid material, such as carbonic acid and chlorin, are set free. In the cathode watery material and the alkalies are collected. It is asserted that these materials in the nascent state exert a strong chemic influence. Albumin is coagulated, the vessels are narrowed, and a hard, dry, brown-red slough occurs, while under longer employment the tissues are destroyed. About the negative pole a soft, succulent, glue-like, easily scraped off white slough occurs, as if one had employed concentrated caustic potash. Consecutive hemorrhages may follow the employment. The negative current is absorbent, and is much more painful than the positive. Investigations have demonstrated that the positive pole acts more on the cell germs or cellular tissue, and the negative upon the protoplasm. The latter is more diffuse, while the former has a sharper limitation.

2. The Interpolar Method.—Apostoli's critics assert that the methods are not without danger. The principal dangers of myoma operations are hemorrhage and sepsis, but we have radical operations which present various series of dangers, embolus, pneumonia, ileus, and death from chloroform, without considering the later disturbances of nutrition. When we come to consider the advantages and disadvantages of electric treatment, we are led to the conclusion that it should be confined to the uncomplicated cases, while those cases which threaten life should be subjected to operative treatment.

526. (*c*) **Surgical.**—The surgical treatment of fibroid growths may be either palliative or radical, but we will consider the procedures under the two divisions of vaginal and abdominal, according to the route by which the tumor is most accessible and may most readily be subjected to treatment.

The vaginal procedures consist in:

1. Dilatation and curetment.
2. Incision of the neck.
3. Incision of the capsule.
4. Removal.
    - (*a*) Torsion.
    - (*b*) Incision of the pedicle.
    - (*c*) Enucleation.
    - (*d*) Morcellement.
5. Ligation of the vessels.
6. Hysterectomy.

The abdominal route includes:

7. Castration.
8. Ligation of vessels.
9. Myomectomy.
10. Enucleation.
11. Supravaginal amputation or partial hysterectomy.
12. Panhysterectomy.

Vaginal Procedures.

527. (1) Dilatation and Curetment of the Uterus.—Dilatation of the uterus may be indicated as the first stage in treatment of the uterine growth or for the purpose of diagnosis. It may be accomplished by the mechanical dilatators of Hegar, but without tearing the neck they will not afford sufficient dilatation of the cervix to permit the introduction of the finger. The preferable plan of procedure is the introduction of a laminaria tent, and the vagina should be thoroughly cleansed and rendered as nearly aseptic as possible before its introduction. The cervix is exposed by a Sims speculum or perineal retractor. The cervix is seized with a double tenaculum, the os exposed, the plug of mucus filling the cervical cavity removed, and the canal thoroughly disinfected; then as large a tent is selected as can readily be introduced, or, when the canal is pretty well dilated, a nest of tents may be employed. These tents should be previously sterilized by heat and placed for a few minutes before their employment in a saturated solution of iodoform in ether. After the tent is introduced iodoform gauze is placed beneath it to protect the parts from infection and to keep the tent from being extruded. Usually, at the end of twelve hours the cavity will be sufficiently dilated to permit the introduction of the finger. If the dilatation is insufficient, the canal can be enlarged by the employment of Hegar's bougies, or with a second series of tents. The exposure by dilatation permits the situation of the growth and its size and relations to be recognized. The curet is used in a manner similar to that described in the treatment for endometritis. It should be done thoroughly to remove the hypertrophied mucous membrane. This removal of the hypertrophied tissue ruptures and scrapes away the diseased vessels, and is effective in the arrest of hemorrhage. It should be followed by careful irrigation of the cavity, and subsequently by painting the cavity with tincture of iodin or carbolic acid, or with a mixture of these two agents. The curetment of the uterus, while effective in decreasing the hemorrhage, is not unattended with danger; the cureted surface of the tumor is exposed to the danger of interference with its nutrition and to the possibility of the introduction of germs and the subsequent development of suppuration. When the myomata project into the uterine canal, and the latter is irregular, difficulty is experienced in reaching all points of the canal with the curet, and the plan of treatment will not be effectual. In small tumors that cause severe hemorrhage curetment is of no value, and nothing short of the removal of the tumor will be of service.

528. (2) Incision of the Cervix.—This procedure is another palliative measure. It consists in making a bilateral or an an-

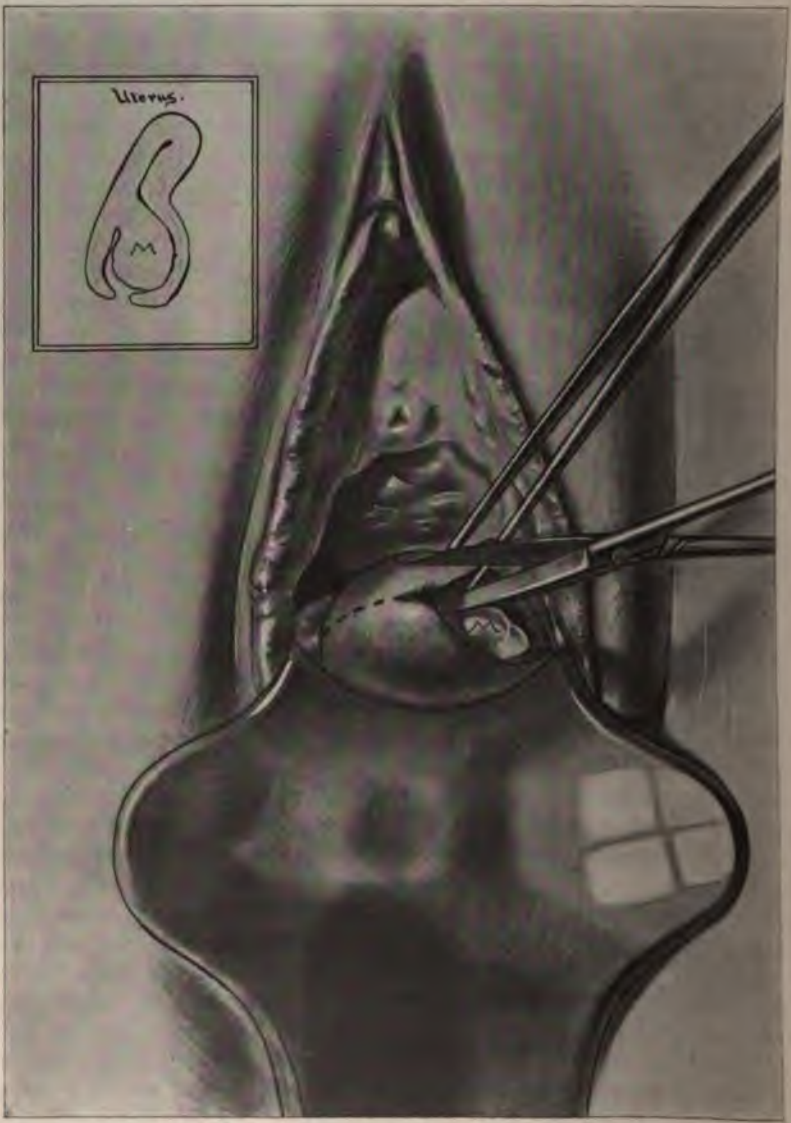

Fig. 456.—Incision of Cervix to Expose Intra-uterine Myoma.

terior incision through the cervix, which diminishes its resistance and facilitates the extrusion of the tumor. When the body of the uterus is well dilated by the growth, this procedure permits the tumor to be more rapidly extruded into the vagina, and it is thus rendered more accessible. It also may be, and is, preferably a first stage in operative procedure for the removal of the growth.

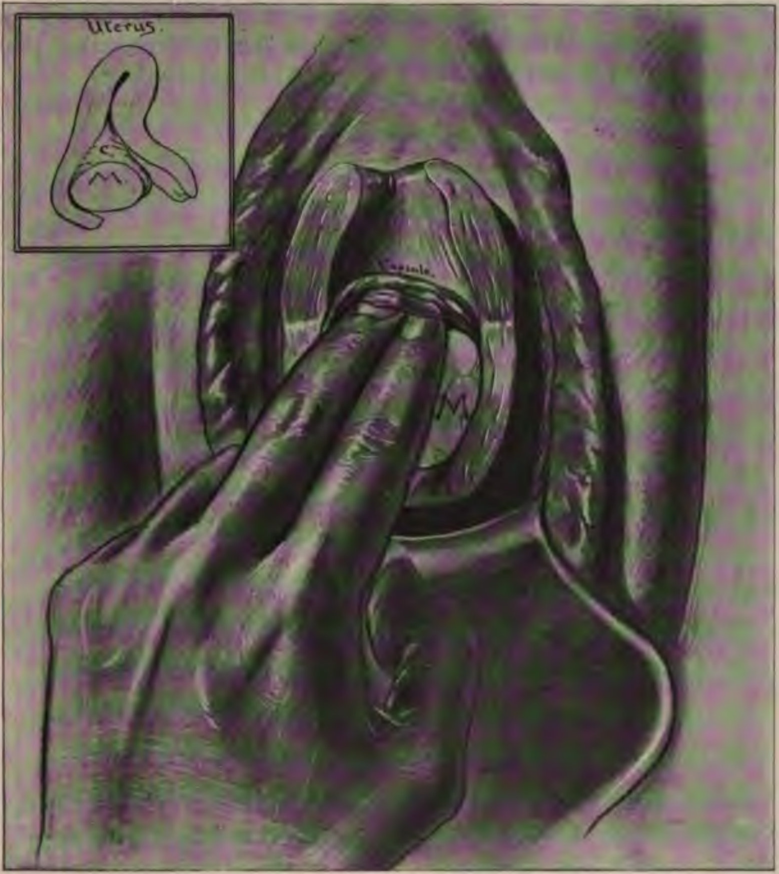

Fig. 457.—Cervix and Capsule Incised, the Latter Pushed Back.

529. (3) Incision of the Capsule.—In sessile submucous or interstitial fibroids which project into the cavity of the uterus the more rapid expulsion of the tumor is accomplished by incising the uterine surface of the tumor into and through its capsule. The wall is pushed back and the tumor partly enucleated, which decreases the resistance. Subsequent contraction promotes the extrusion of the tumor into the uterine cavity, which renders it a pedunculated growth. This plan of treatment, however, is not free from danger, for the rapid extrusion which thus takes place not infrequently causes loss of vitality of the tumor and degenerative processes which may be dangerous to the life of the individual. When such a procedure has occurred, it is preferable that the tumor should be subjected to extirpation.

530. (4) **Removal of the Growth.**—(*a*) *Torsion.*—When the growth is situated in the vagina, after having been extruded from the cavity of the uterus, and hangs by a pedicle, it can very readily be removed by torsion. It consists in seizing the tumor with a pair of strong vulsellum forceps, preferably four-bladed, and turning these upon their axis until the pedicle of the tumor has been twisted off. When the strong vulsellum forceps are not at hand, the same purpose may be accomplished by seizing the tumor upon opposite sides with a double tenacula, and then rotating the tumor by traction with these instruments. When the tumor is not exposed, it can be rendered accessible by splitting the cervix, by a bilateral incision, until the intra-uterine tumor

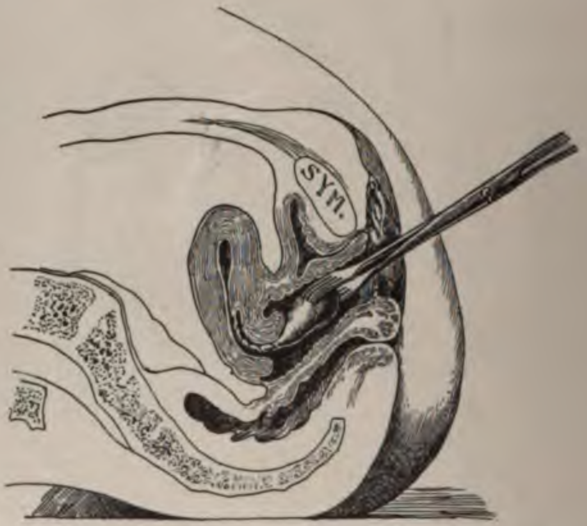

Fig. 458.—Removal of Myoma by Torsion of Its Pedicle.

is exposed, when it can be removed, if the tumor is pedunculated, in the manner described.

(*b*) *Incision of the Pedicle.*—When the tumor has been extruded from the uterine cavity, it may be seized and dragged upon with a pair of forceps until the finger can be passed over it as a guide, when with a pair of scissors the pedicle can be cut through; or the intra-uterine tumor can be rendered accessible by dilatation with tents, or through bilateral incision of the cervix. In all these operations rigid asepsis must be practised.

(*c*) *Enucleation.*—Enucleation was first practised in submucous fibroid growths of the sessile variety. Here, when the uterus is dilated, or after its dilatation, the tumor is exposed, seized with a pair of forceps, drawn upon, and, with the finger or a blunt dissector, the attachment to the uterus is broken and the tumor removed. Thomas employed a serrated spoon, which hugged closely to the surface of the tumor and pushed the uterine wall off. This spoon, however, is not without danger in cases in which the wall of the uterus over the tumor is thin. Enucleation can be as readily practised with a blunt dissector, rolling the tumor about so that the surface to be separated is under observation, or, when the work has to be done high up in the uterus, the finger should be used as a guide. Interstitial tumors may also

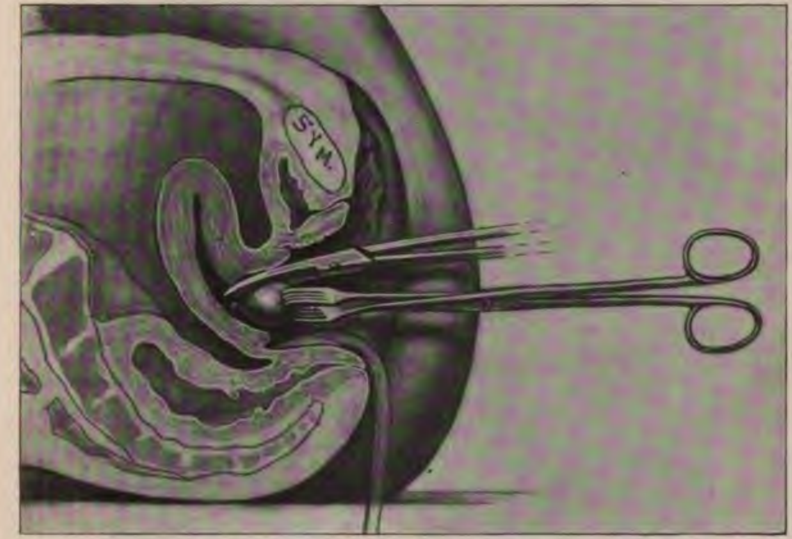

Fig. 459.—Incision of Pedicle of Myoma.

be managed and removed in a similar manner. If necessary, as a preliminary the cervix may be split by bilateral incision above the internal os. An interstitial tumor of the anterior wall may be made accessible by a vertical incision through the anterior lip until the base of the tumor is exposed, when it is seized and the tissue bluntly dissected away from it. Occasionally, when the cervix is undilated and the tumor is in the anterior wall, it may be exposed by a transverse incision above the cervix, and subsequently by a vertical cut at right angles to the former; the flaps are turned back and the tumor is enucleated. When necessary, the bladder may be dissected from the anterior surface of the uterus until the peritoneum is reached, or the latter even opened. Retro-uterine tumors can become accessible through a posterior

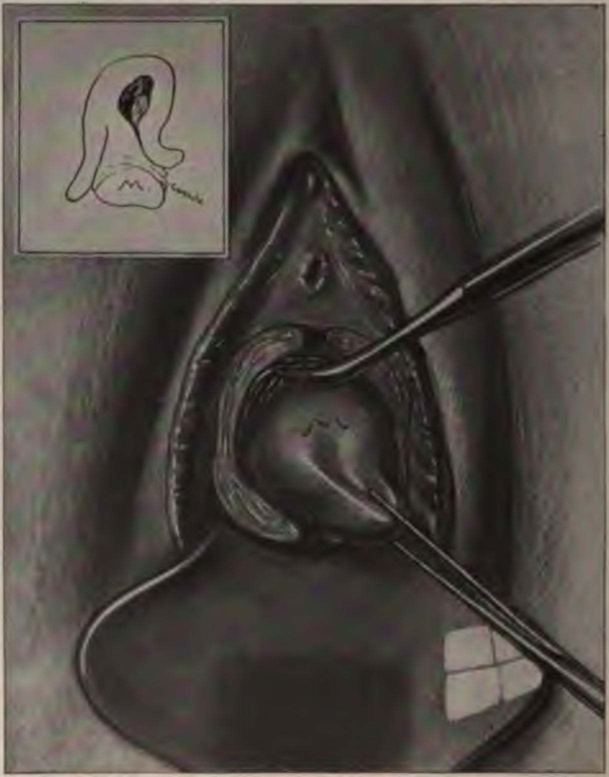

Fig. 460.—Enucleation of Tumor through the Vagina.

vaginal incision, which will permit the fundus to be turned downward, and the enucleation is accomplished before the organ is returned to its normal position.

(*d*) *Morcellement.*—Not infrequently, as we proceed in the enucleation of these growths, it will be found the tumor is so large that we are unable to complete our enucleation or to deliver the tumor through the vagina. In such cases the tumor may be reduced in size by the process described by the French as morcellement, which consists in cutting out sections of the mass with scissors or knife, and working up on one side until the tumor can be drawn down and the remaining portion completely enucleated. It frequently can be accomplished by dividing the tumor into halves, quartering it, or cutting off small sections of the accessible portions with scissors or knife until the entire mass is re-

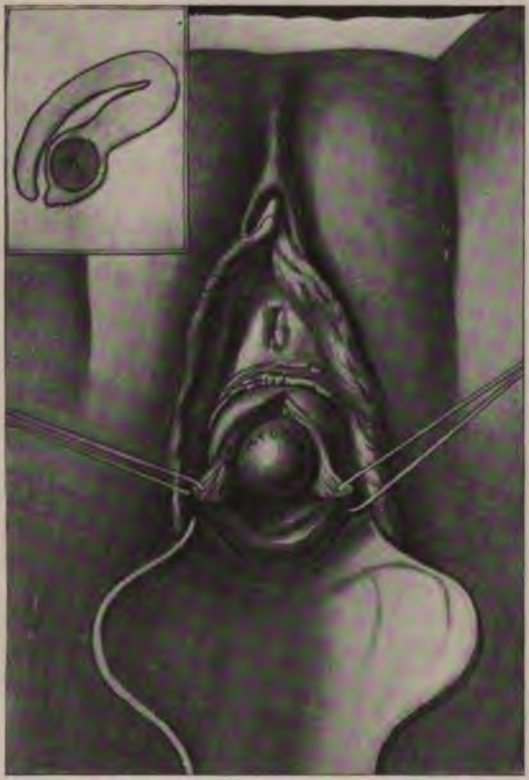

Fig. 461.—Interstitial Tumor Exposed by Vertical Incision of the Anterior Lip.

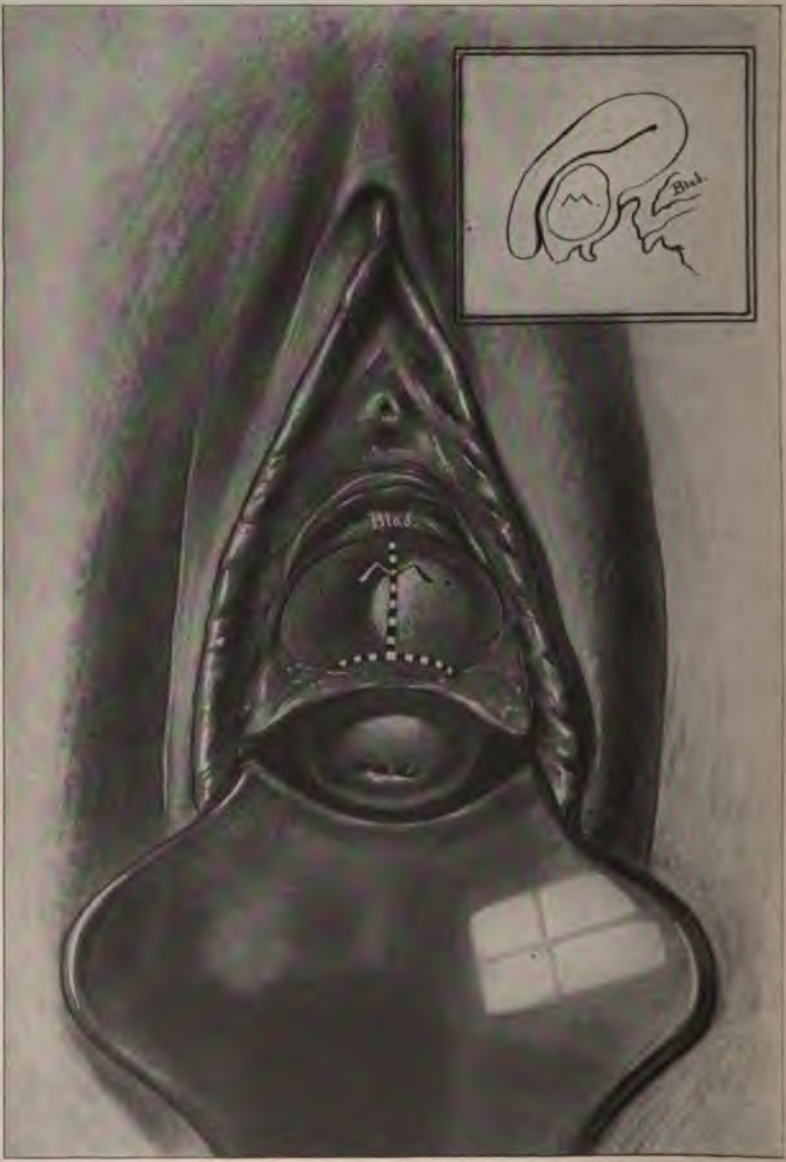

Fig. 462.—Myoma of Anterior Wall Exposed by Transverse and Vertical Incision.

moved. This treatment is applicable to all the tumors accessible through the vagina. After such removal of growths there remains a considerable cavity, which is lined by tissue of low vitality. It should be thoroughly cleansed, loosely packed with iodoform gauze, and the patient watched, that no renewal of bleeding occurs. The gauze packing prevents the accumulation of blood in the uterine cavity, keeps the surfaces apart, promotes the sealing of the surfaces by plastic exudate, and, by its presence as a foreign body, favors contraction of the remaining portion of the uterus. At the end of three days the gauze should be removed, the cavity thoroughly irrigated, and the uterus repacked, or a drainage-tube should be inserted, through which irrigation can subsequently be practised. When the cervix has been excised, it may be sutured, as in the operation for lacerated

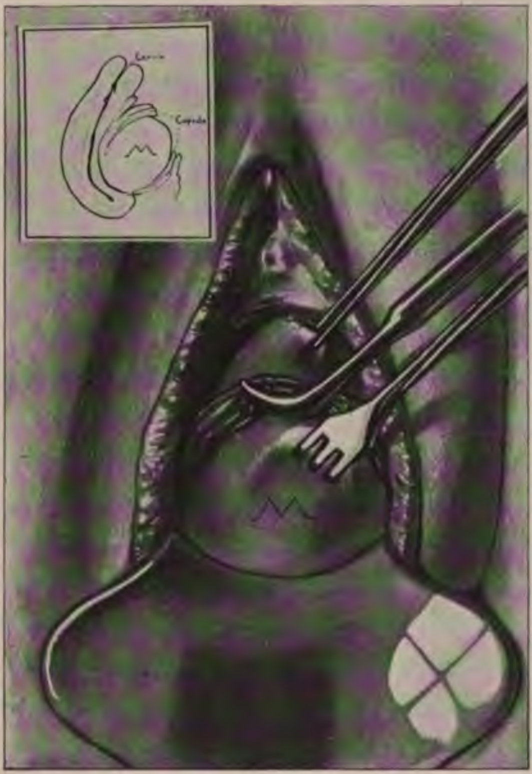

Fig. 463.—Myoma of Posterior Wall Exposed by Retro-uterine Incision.

cervix. All incisions, whether bilateral, through the anterior lip, or in the wall of the uterus, should be closed by suture.

531. (5) Ligation of the Vessels.—Franklin Martin introduced an operation for systematic ligation of the uterine arteries. Incision was made through the mucous membrane at the side of the uterus, the vaginal wall pushed back, and the broad ligament opened. In this procedure careful examination was made for the site of the uterine artery, which was ligated. Care must be exercised, in accomplishing this, that the ureter is not included in the ligature. A similar procedure is followed upon the opposite side, and both vessels are thus secured. Martin advocated this operation; he also advised that in large tumors the broad ligament shall still further be spread out, and the ovarian artery upon one side seized and ligated. This confines the future blood

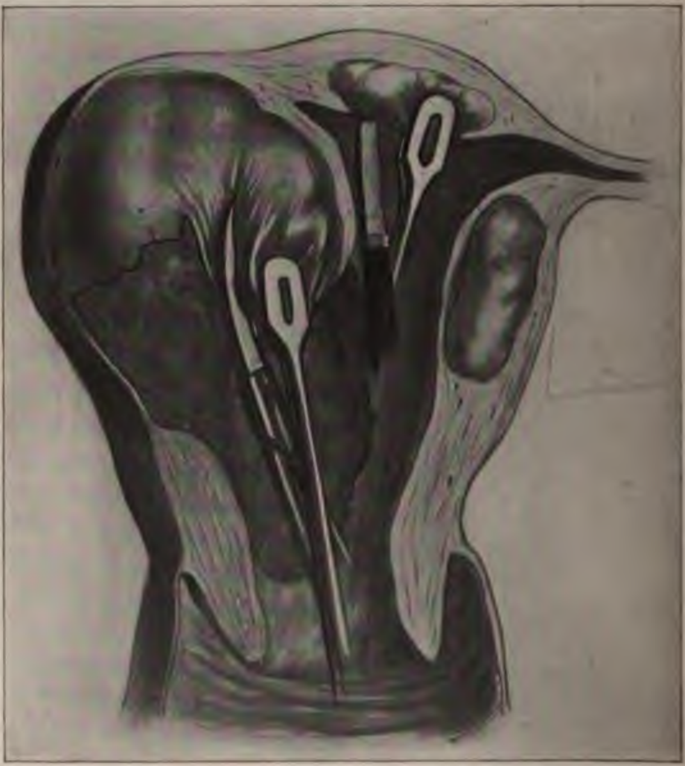

Fig. 464.—Removal of Myoma by Morcellement.

supply of the tumor to one ovarian artery. Martin found that this plan of treatment resulted in arrest of hemorrhage and decrease in the size of the growth. The main objection to this plan of treatment is the possibility that in the ligation too much of the supply of blood may be cut off, and cause a loss of vitality and subsequent necrosis of the growth, which will greatly increase the danger to the patient.

532. (6) **Hysterectomy.**—The success of the removal of the uterus through the vagina early led to the consideration of this procedure in the treatment of fibroid growths of moderate size. The operation may consist, first, in an incision around the cervix through the vagina; the vaginal walls are pushed back until the peritoneum, front and back, is reached. If multiple myomata exist, which make the extirpation at once difficult, the growths may be enucleated and the size of the uterus decreased. The preliminary amputation of the cervix after the uterine arteries are secured, by decreasing the bulk, renders the growths more accessible to treatment. The growths may be removed by separate enucleation, or, when too large for this purpose, by morcellement. The fundus of the uterus is turned down, forward or backward,—preferably forward, as the tube and ovary are rendered more accessible to the touch,—and the ligatures or the clamp applied, as the operator prefers. After the uterus is separated upon one side the other side is more accessible, or we may practise the method of Landau, in which he splits the uterus vertically and removes one-half at a time.

The treatment of the wound will depend upon whether forceps or ligatures are used. The first consideration is thorough hemostasis; make sure that all vessels are controlled. (For method of wound treatment see Cancer.) The vaginal route is preferable in multiple growths of small size or in myoma in which the growth has attained a size not greater than a child's head. In the latter cases morcellement would have to be practised. Some operators pride themselves on being able to remove per vaginam growths which extend to the umbilicus, but such a course is attended with so much danger as to render it an unjustifiable method of treatment.

Abdominal Route.

533. (7) **Castration.**—As early as 1872 Hegar advocated the removal of the ovaries to establish premature menopause in order to accomplish reduction in the size of fibroid growths. This procedure was devised in recognition of the fact that fibroid tumors decrease in size with the establishment of the climacteric. The operation consists in the removal of the ovaries and tubes or the

performance of oophorectomy. It was found, however, that the removal of these organs was not infrequently attended with great difficulty, as the size of the growth led to a very vascular condition of the broad ligaments, and often the ovary was spread out upon the surface of the tumor, which renders its enucleation and removal exceedingly difficult; sometimes the tumor rotated in such a way as to carry one ovary posterior, rendering it absolutely inaccessible without reduction of the size of the tumor. The procedure, unfortunately, was not always successful, as, indeed, many patients who were not victims of fibroid growth continued to menstruate or to have a bloody discharge subsequent to the removal of both ovaries. This is more probably due to the fact that the ovarian stroma extends along the course of the ovarian ligament, and the removal of the mass in the ordinary method of procedure did not remove the entire ovarian structure. So long as any portion of it remained, to mature and throw off ova, just so long would bleeding from the uterus occur. Tait advised the entire removal of the Fallopian tubes as a sure method of establishing the climacteric, attributing the influence dominating menstruation to these organs. The advantage of this suggestion doubtless was that the ligature carried deeper and the ovarian artery was ligated, which escaped in a more superficial ligation. To insure the ligation of the artery it is generally recommended that the ligature should be placed sufficiently deep to inclose the round ligament in it. The advantage of castration is that in typical cases it can be done in a very few minutes, and with very slight danger; but, unfortunately, in large fibroid growths the ovaries are not always typically situated. In every such operation, then, the first consideration should be to examine carefully the situation of the ovaries and the relation to the growth, and see whether both can be thoroughly removed. The removal of one would be powerless to exercise any influence on the progress of the growth or the correction of its abnormal symptoms. Occasionally, the tumor causes torsion of the uterus by which one ovary is moved toward the front, and the other behind the tumor in such a situation that it can not be reached; or, again, the ovary may be spread out over the surface of the tumor, so that the attempt to enucleate or remove it would be attended with more serious hemorrhage than would be occasioned by the removal of the growth. Another objection to the operation is that it does not always control the hemorrhage. In the performance of the operation it is absolutely necessary that every portion of both ovaries should be removed. The smallest amount of ovarian tissue remaining insures the continuation of the hemorrhage. When the fibroid is large, the entire removal is frequently attended with the greatest difficulty, as by torsion the ovarian stroma may be almost wholly included in the surface of the tumor. The operation is sometimes still further complicated by the existence of tubal diseases, such as pyosalpinx, which, with extensive adhesions, fix together the ovaries and tumor mass, so that castration will be attended with greater difficulty than would be the removal of the uterus and ovaries. The operation should not be considered in cases of pure submucous myoma or in cystic degeneration of the fibroma. In pedunculated subserous and adherent tumors, and in very large interstitial growths, it is also contraindicated. In a freely movable uterus, in which the cervix can be readily reached, the operation affords no advantages over supravaginal amputation. Castration has a further disadvantage in not infrequently producing vasomotor symptoms, such as congestion, sweatings, hot flashes, pain in the head and sacrum. These symptoms are worse in the young than in those who are near the climacteric. Other symptoms are rather more rare, as, obstinate vertigo, profuse leukorrhea, cardialgia, and occasionally vicarious bleeding.

534. (8) **Ligation of the Vessels.**—The operation of castration having demonstrated the beneficial influence of ligation of the ovarian arteries, it was a very natural step to proceed to ligation of these vessels through the abdominal incision in preference to the more radical operations of partial or complete hysterectomy. Hofmeier reported a case of Schroeder's in which extirpation of the myoma seemed impossible, and where, in order to decrease the size of the tumor, the lateral and median vessels of the ovary were tied, with good result. Antal, at an earlier date, after ligation of the vessels observed an atrophy of the ovary, and, in place of castration, thereafter incidentally employed the mere ligation of the vessels in order to affect the function of the ovaries. Rydigier tied all six uterine arteries of a patient on the 27th of June, 1889. The spermatic arteries were ligated; then, after splitting the peritoneum near the cervix uteri, the uterine arteries were tied; and, finally, the ligature placed about each round ligament. At the end of four months the tumor had decreased to three-fourths its former circumference; but after a year hemorrhage, which had completely ceased, reappeared in a stronger degree, and the patient perished from marked anemia before radical operation could be performed. Byron Robinson has advocated the ligation of both ovarian arteries and the upper part of the uterine artery at the side of the uterus. This procedure is more effective in the smaller growths, and where hemorrhage is a marked symptom.

535. (9) **Myomectomy.**—In more or less pedunculated sub-

peritoneal fibroids there could be no question as to the advisability of myomectomy. The operation consists, when the pedicle is small, in cutting through the pedicle with scissors or knife and uniting the edges of the cut surface with sutures so deeply placed as to make sufficient pressure to control the bleeding. In larger pedicles the operation consists in making peritoneal and muscle flaps, which can be brought together over the base of the tumor. In this way a single growth or a number of growths may be removed, leaving a normal uterus, and leaving the ovaries and tubes undisturbed.

536. (10) Enucleation.—The ease with which smaller fibroid growths can be enucleated from their beds has led to the practice, by Martin and others, of shelling out interstitial fibroid growths from the uterine wall, leaving the uterus in place. The procedure is performed as follows: The uterus is raised up, the position of the growths determined, and an incision made over the more prominent growth in a vertical direction in order to injure as few vessels as possible. The incision is made into the uterine wall and through the capsule, and the tumor is exposed. The tumor is then seized with a double tenaculum and drawn up, while with a blunt dissector the tissues are pushed off and the enucleation is accomplished. The removal of the tumor is fol-

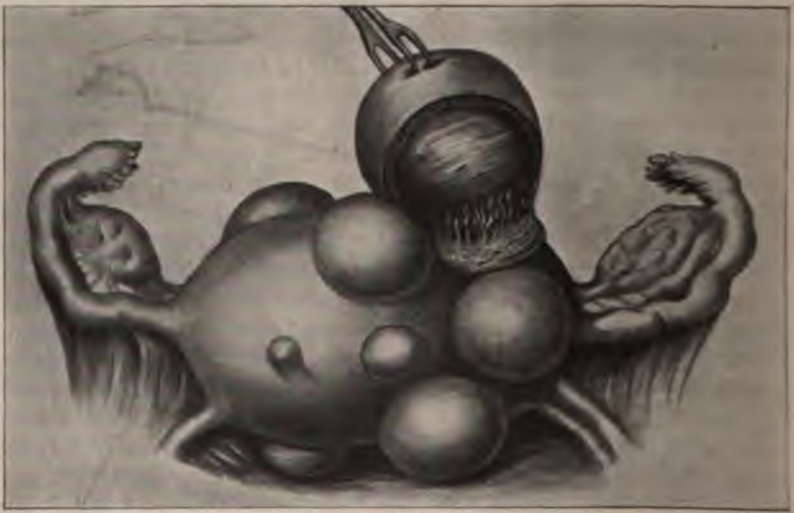

Fig. 465.—Abdominal Myomectomy.

lowed by firmly packing a gauze pad into its cavity. If large vessels bleed, these should be seized and controlled with pressure forceps. The wall is still further investigated, and, when possible, other fibroid growths situated within it should be brought through the first incision. This, in some cases, however, may involve more extensive mutilation of the uterus than would a separate incision over the mass.

The advocates of this procedure generally limit it to the cases in which but a few growths are found in the uterine wall, and it was formerly particularly directed that the uterine cavity should not be opened. When we consider the investigations, however, of Menge and Kronig, which demonstrate that the uterine cavity is free from pathogenic germs, there should be no hesitancy in opening it, if necessary, to remove growths. In one patient I thus enucleated thirteen fibroids from the wall of the uterus, five of which were removed from the uterine cavity. After the operation the patient recovered without a single abnormal symptom. From another woman, nine growths were removed. From an unmarried woman, a fibroid, which projected into the cavity of the uterus and had filled it up so that the tumor could be touched through the cervix, was enucleated through the abdominal cavity by posterior uterine incision. A gauze drain was passed

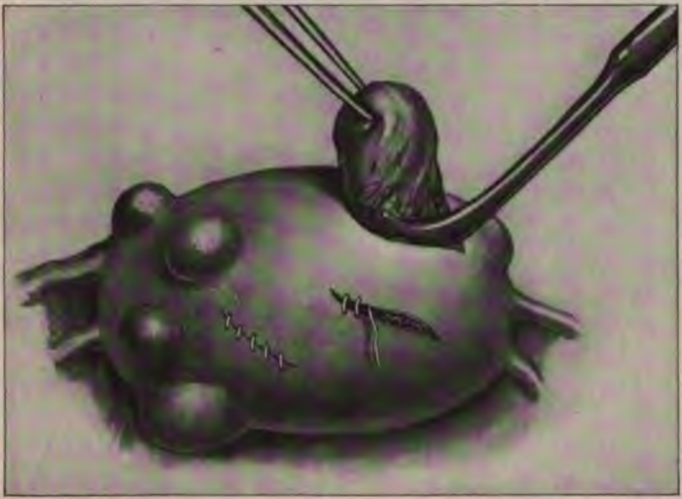

Fig. 466.—Abdominal Enucleation of Myomata and Method of Closing the Uterine Wound.

through the cervix and the uterus closed over it. The patient recovered.

After the enucleation of growths the wounds in the uterus should be carefully sutured by deep and superficial layers of chromicized catgut, exercising the precaution to include and secure with the suture any large vessels in the wall which may

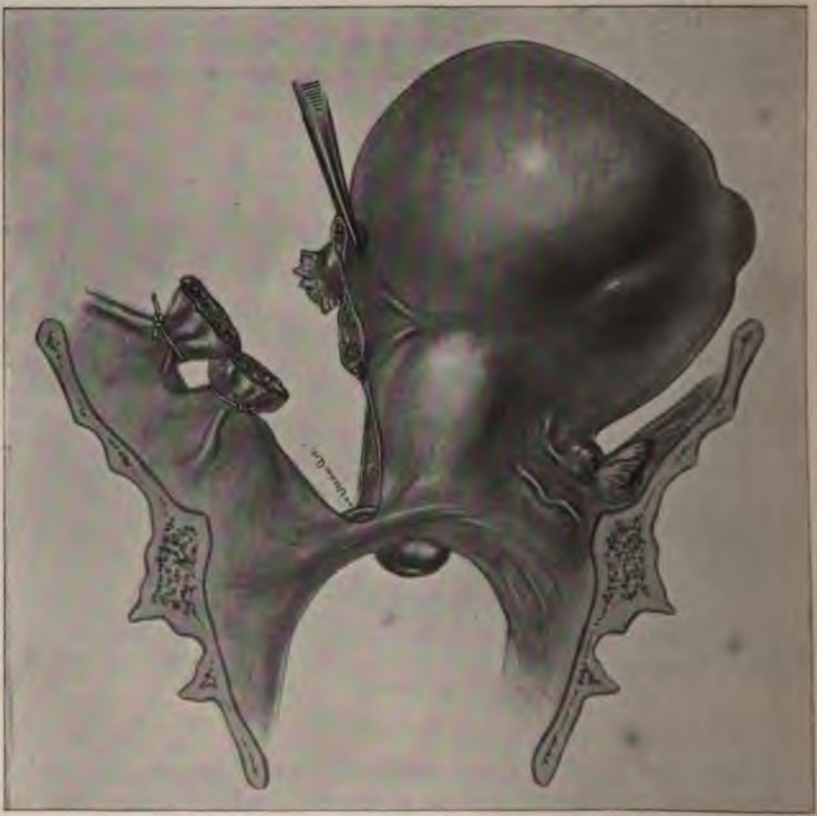

Fig. 467.—Supravaginal Removal of Myomatous Uterus.

bleed, and by the superficial suture to bring a good portion of the peritoneal surface of the uterus in apposition. Before the abdomen is closed all the wounds must be thoroughly inspected to see that hemorrhage is completely controlled. Should there be a tendency to excessive bleeding, it would be better to ligate the ovarian arteries as an additional safeguard. This operation is not suitable for very large growths in which the uterus is very extensively mutilated, or where the tumors are situated laterally and involve to a greater or less degree the Fallopian tube. In enucleation of intraligamentary growths the broad ligament is split, in order to expose the growth. In these cases care must be exercised that the ureter has not been displaced upward by the tumor.

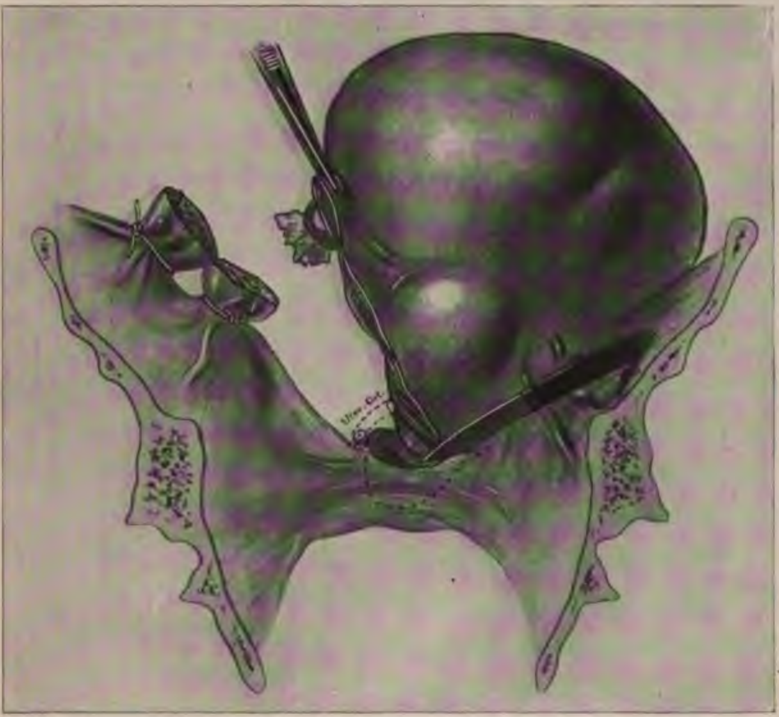

Fig. 468.—Cervix Cut Across Preliminary to the Complete Ligation of One Ligament.

It is important, also, to avoid injury to the ureter or its ligation in the subsequent closing of the broad ligament.

537. (11) Partial Hysterectomy, or Supravaginal Amputation of the Uterus.—This was the earliest abdominal operation performed for the removal of myomatous growths, and the earlier operations were cases of mistaken diagnosis, the procedure having been undertaken for the removal of ovarian tumors. The first deliberate operation seems to have been performed by Burnham, of Lowell, in 1853, in which the patient recovered. A large proportion of the earlier operations were unsuccessful; the difficulty in controlling hemorrhage from the elastic stump rendered its intraperitoneal treatment exceedingly dangerous, so that the procedure was practised of treating the stump extraperitoneally. The first to form a systematic method of operation was Koberle, of Strasburg. The mass was raised and the broad ligaments were ligated on each side and cut through so as to permit the mass to come out of the pelvis; then the cervix was transfixed with pins placed at right angles to each other, so that it could be thus held outside of the abdominal cavity. An elastic ligature or serre-nœud was applied beneath the pins. The mass above was removed and the stump brought out at the lower angle of the wound. The parietal peritoneum was fastened to the peritoneum of the stump by a continuous catgut suture. To promote the rapid union of the peritoneal surfaces, and thus preclude the possibility of the discharges from the sloughing stump gravitating back into the peritoneal cavity, the abdominal incision above was closed down to the stump; the surface of the stump was dried, cauterized with a solution of chlorid of zinc, dusted with dusting-powder, and gauze packed about it.

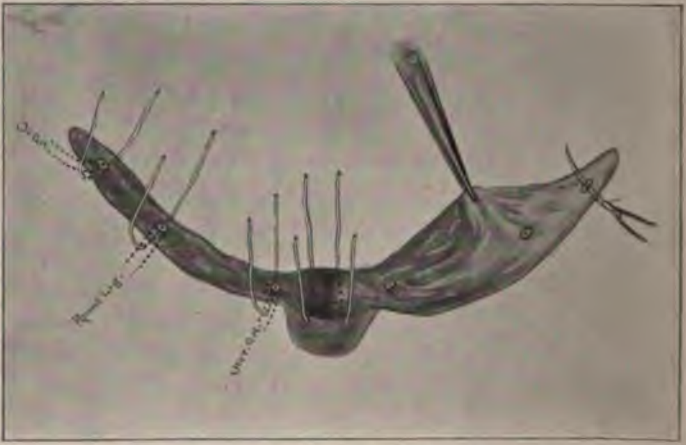

Fig. 469.—Stump Covered with Peritoneum.

Occasionally, under this plan of treatment, the stump would become dry and gradually be thrown off without suppuration. It resulted, however, in an excavation, by the retraction of the stump, which had to close by a process of granulation, making convalescence prolonged. Often it was difficult to prevent the putrefactive changes taking place and resulting suppuration. The weakened abdomen favored the subsequent development of ventral hernia. The difficulty of maintaining asepsis, the delayed convalescence, the weakened abdominal wall, led to the study of methods by which the stump could be treated within the peritoneal cavity. One of the earliest operators to attempt the intraperitoneal treatment was Schroeder, who published, in 1880, an account of his cases. He ligated that portion of the broad ligament containing the spermatic arteries with two ligatures, and cut between them. The round ligament is similarly ligated and cut between the ligatures. Around the stump, which consists of the cervix, a rubber ligature was placed, the crossed ends of which were fastened by a pair of forceps. The mass was then amputated, the cervical cavity disinfected with a 10 per cent. solution of carbolic acid, the stump sutured in sections, the cervix closed from above with continuous suture, then the muscle tissue over it, and, finally, the external layer of the peritoneum by continuous suture. For this purpose he employed carbolized silk, and, later, juniper catgut. After the union of the surface the rubber tube is removed. Other operators have modified this procedure, as Zweifel, with partition ligature, and H. O. Marcy, with cobbler suture. Baer avoided all mass ligatures on the cervix and controlled hemorrhage by tying single vessels. He did not treat the cervical canal, considering the normal mucous membrane the best antiseptic guard. The institution of these measures by which hemorrhage can be controlled renders the intraperitoneal method of treatment more popular, and has almost entirely superseded the extraperitoneal procedure.

538. (12) **Panhysterectomy,** or total extirpation of the uterus, is a preferable procedure in those cases in which the cervix has been largely taken up by the extension of the growth, or where it has undergone extensive disease. The operation consists in the ligation of the broad ligament, as in the partial hysterectomy; extension of the flap forward, just above the reflex of the peritoneum upon the bladder, and pushing the bladder from the cervix; the introduction of a second ligature on either side, carried below the uterine artery, the pulsation of which can be detected with the finger. With this ligature the broad ligament is separated on each side, which permits the uterus to be raised up; then, throwing the uterus forward, as suggested by Doyen, an incision is made over its posterior surface at the junction of the vagina with the uterus. The vagina opened into, the incision is carried around, hugging the stump closely so as to avoid injury to the ureter or bladder. The assistant follows each step in the proce-

dure closely, ready to secure with pressure forceps a bleeding vessel. By seizing the cervix with a double tenaculum, and drawing up upon it, the further dissection can be accomplished without danger to the surrounding parts. Having removed the tumor and the cervix, the cavity is then carefully examined for bleeding points. Any bleeding vessels are secured by passing beneath them ligatures and tying them, preferably using catgut, for the reason that silk readily becomes infected and causes a continuous sinus and profuse discharge as long as it remains. Having secured the bleeding vessels with catgut, we close the peritoneum over the cavity, and, from the vagina, loosely pack with iodoform gauze, or the gauze may be carried through the opening into the vagina and the peritoneum stitched over it. If the surface is largely broken up, and the cellular tissue opened into, the preferable plan is not to suture the peritoneum tightly, but simply to draw it over the opening, or to carry a strip of iodoform gauze into the vagina, packing it over the raw surface to afford a vent

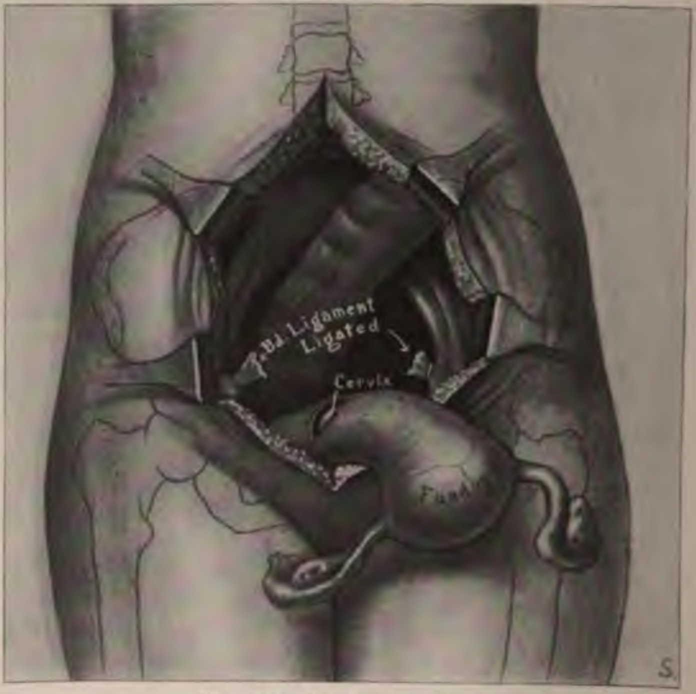

Fig. 470.—Panhysterectomy.

for serous accumulation. This plan of treatment is preferable to closing the wound, as the healthy peritoneum above is better capable of taking care of such discharge than is the loose cellular tissue in which it otherwise will accumulate. After the removal of the uterus and the careful cleansing of the wound, the abdomen is closed. This operation of complete hysterectomy for fibroids was probably first done by Mary Dixon Jones, in 1888. In 1889 Joseph Eastman, of Indianapolis, devised a grooved staff by which the posterior vaginal wall could be readily and securely opened and the operation expedited.

539. **Summary.**—In this description of the surgical treatment of fibroid growths we have endeavored to give a résumé of the various procedures, and, in so doing, recognize that the student, when he comes to treat a case, may be in doubt as to which particular method he should employ. We feel it but proper to indicate what we believe to be the most justifiable method of procedure. In submucous growths in which hemorrhage is a marked factor the tumor, when accessible, should be removed by torsion or incision of the pedicle. If the tumor is still within the cavity of the uterus, the cervix may be split by a lateral or an anterior incision, as may be most convenient, and the tumor removed by torsion, by incision of the pedicle, or by enucleation. If the tumor is too large to permit of its ready removal, it should be removed by morcellation. Vaginal hysterectomy should be confined to those growths which are sufficiently small to permit ready passage through the vagina, and yet in which the uterine structure is so taken up and involved as to preclude the retention of the healthy uterus, or in which the ovaries and tubes are secondarily involved, precluding the retention of the myomatous uterus. Of the abdominal operations named, myomectomy, enucleation of the growth, or partial or complete hysterectomy should be performed. The principle here should be that no organ should be sacrificed the function of which can be maintained, so that when the ovaries and tubes are in such a condition as to justify the retention of the uterus, the myomectomy or enucleation should be practised, even though a large number of fibroid growths be present. When the uterine structure is so involved, or ovarian, uterine, or tubal disease complicates it, we are forced to resort to either the partial or the complete hysterectomy. Partial hysterectomy, when the cervix is small and healthy, should be preferred.

540. **Accidents During an Operation.**—*Hemorrhage* is an accident which is avoidable with careful application of ligatures. Bleeding from the stump is avoided by applying ligatures upon each side to control the blood supply through the uterine arteries.

A large mass may be crushed by compression before applying the ligature. The groove thus formed will decrease the danger of the ligature slipping. Hemorrhage will be indicated by symptoms of increasing shock, and the occurrence of such symptoms should be considered an indication for prompt reopening of the wound to secure the open vessel, for, should the patient rally from the hemorrhage, the large accumulation in contact with the intestine in the weak state of the patient endangers her subsequent course, from sepsis. All bleeding vessels should be firmly secured before the peritoneal wound is closed. Care must be exercised in short broad ligaments that the ovarian artery is not retracted behind the peritoneum from the grasp of the ligature, there to produce a concealed hemorrhage or thrombus which may become so large as to open into the peritoneal cavity.

Injuries to the Hollow Viscera.—In the injuries to the viscera the bladder is most likely to be affected, as it is closely attached to the anterior wall of the uterus and cervix. Its relations to the uterus and tumor will largely depend upon the situation of the growth. One which has originated in the lower part of the anterior wall of the uterus may very readily drag up the bladder, and cause it to be displaced upward. The bladder may be displaced to one side, and not cover the anterior surface of the uterus and tumor. This may readily occur because of partial torsion of the neck of the uterus or from the size of the growth. In one case I incised the bladder when it was displaced upward and to the left side, to form a quite distinct tumor that did not entirely disappear under the use of the catheter. The bladder was accidentally incised in opening the abdomen. It was immediately sutured, removed from the surface of the growth, and the patient recovered. Inflammatory adhesions may bind the bladder to the anterior surface of the tumor, and in the subsequent development may drag it so high that it is overlooked in the separation of adhesions. In such a way I was so unfortunate as to incise the fundus where adhesions were extensive, involving both anterior and posterior surfaces. In this patient recovery took place after the bladder wound was sutured. When the bladder is injured, the wound should be closed by sutures at once, whether it occurs upon the peritoneal or in the nonperitoneal surface. Precaution should be exercised in the use of the sutures that they do not include the vesical mucous surface. It is well to have a double row of sutures, in order to bring a larger surface of the bladder-wall in apposition, and in the subsequent convalescence the bladder should be frequently evacuated. When the wound has been extensive, it would be preferable to employ a permanent catheter for the first week, and for the second week to have the urine drawn at frequent intervals. The possibility of displacement of the bladder by the growth should always be considered, and care should be exercised to avoid its injury.

Injuries of the Ureter.—The situation of the ureter alongside the cervix makes it particularly vulnerable in the removal of large fibroid growths, and particularly in those where the growth is developed low in the broad ligament, which, in some cases, shoves the ureter upward until we find it in the groove between the growth and the uterus. In such patients the dissection should be most carefully practised in order to avoid injury to the ureter. In case of injury, and particularly if the ureter has been cut, the proper procedure would be first to bring about its transplantation into the bladder. In introducing the ureter it is important that it should be anchored in the bladder in such a way as to prevent its slipping back or drawing away from its attachment to the surface of the bladder and permitting the urine to escape into the peritoneal cavity. (See Fig. 208.) If the union with the bladder is difficult because the injury of the ureter is situated so high that the latter reaches the bladder only upon slight stretching, it is well to anchor the bladder to the side of the pelvis, so that no traction shall be made upon the shortened ureter. In those cases in which we have a ureter too short to establish an anastomosis with the peripheral end or a transplantation into the bladder the following alternative procedures have been suggested :

First.—Carry the ureter across and anastomose it with the ureter on the opposite side. In a short ureter this may be attended with considerable difficulty. We should hesitate about imperiling the patient by disturbing the remaining conduit.

Second.—The introduction of the ureter into the corresponding colon. This operation has not been attended with very satisfactory results. The infection and gases from the intestine have been known to be carried into the ureter, to cause infection of it and the pelvis of the kidney. The contact of the urine with the intestine is said to cause considerable irritation and to produce a marked diarrhea.

Third.—Bring the extremity of the catheter out through the abdominal wound or make a fistulous opening to the skin surface. Such a procedure is attended with no little discomfort to the patient, as the constant soiling of the person and clothing with the urine is very distressing to a cleanly patient and annoying to those who have to be associated with her.

Fourth.—Ligate the ureter and drop it back. This ligation should be made by a double ligature, for the reason that, under the process of pressure-atrophy, the ligature becomes loosened and, when single ligatures are used, the urine escapes into the peritoneal cavity, and causes urinary infiltration and septic peritonitis. This condition is less likely to occur when a second ligature is applied from half an inch to an inch above the first. The urine continues to be secreted until the pressure within the cavity of the kidney is equal to the blood pressure, when the secretion is arrested. In such cases the kidney, unable longer to secrete the urine, becomes a useless organ and atrophies, while the extra work is taken up by the remaining kidney. The result of the procedure, of course, will depend, as it would in nephrectomy, upon the condition of the other kidney.

Fifth.—Removal of the kidney.

Intestinal Injuries.—Injuries of the intestine are less frequent. They may occur as a result of extension and firm adhesions to the surface of the growth. The injury is much more likely to take place in the sigmoid flexure of the descending colon and the rectum. As a result of chronic inflammation the adhesions may be very extensive and firm, leading to an injury of the intestine before its possibility could be suspected. In all cases of extensive adhesions, after the removal of the growth careful examination should be made to ascertain the possibility of intestinal injury. Such injuries may also result from complications, such as suppurative disease of the tubes associated with the growth. Recently, in removing a fibroid growth associated with pelvic suppuration I found an opening from a left tubo-ovarian sac into the anterior surface of the sigmoid flexure, into which the thumb could be introduced. Through this the abscess had partly emptied itself at intervals. In closing the wound care should be exercised to trim the edges of the opening, to remove the tissue that has low vitality or has been injured during the process, and to bring the surfaces together by a double row of sutures. Continuous chromicized catgut suture is a very serviceable one, but, as mentioned, the suture should be so introduced as to bring extensive surfaces in apposition. The patient should subsequently be kept upon an albuminous broth diet, and early evacuation of the bowels should be accomplished, affording no opportunity for hard fecal masses to form in this portion of the intestine. In closing the wound, in these fistulous cases, it is well that gauze packing should be applied and drainage practised, for it is always difficult to make certain that all the tissue of low vitality has been removed and that a fistulous opening may not recur. If the abdominal wound is closed, leakage may cause fatal infection of the peritoneal cavity before the gravity of the condition is recognized. If a small fistulous opening in such a patient occurs, it is preferable to keep the wound open and the cavity thoroughly cleaned by frequent irrigation, both by the rectum and the abdominal wound, and to permit nature an opportunity to close the opening by granulation. Nature soon shuts off the tract of the general peritoneum and prevents the possibility of its infection. To reopen such a wound in order to close the fistula increases the danger of general infection.

541. Causes of Death Following Hysterectomy.—The most frequent causes of fatal results are hemorrhage, septicemia, and shock. Hemorrhage may be the cause of death shortly after the operation, from difficulty in controlling the bleeding during the procedure, although these cases must necessarily be rare; or it results from the subsequent slipping of a ligature from the pedicle mass. Unless the condition is recognized at once, the hemorrhage may be immediately fatal. If the enfeebled condition of the patient leads to formation of clot and arrest of bleeding, the large accumulation of blood in the peritoneal cavity may still be a source of danger to the patient, from its infection by its relation to the intestine or from pathogenic germs which may have been left in the pelvic cavity. In this sense it may furnish the cause for the subsequent death of the patient through septicemia. The danger from septicemia is greatly increased in those cases in which the operation has been difficult, owing to intraligamentary growths, when the tissues of the pelvis have been greatly torn during the progress of enucleation, or when the tumor is complicated by the presence of suppurative processes in the tubes, in the ovaries, or in the pelvis. Another prolific source of fatal result is shock. This may be incident to severe hemorrhage during the progress of the operation; or to a protracted operation on account of extensive adhesions, the growth being impacted in the pelvis, or from the previous enfeebled condition of the patient. We are not always able to account for the marked influence of shock. Occasionally, we will find the patient becoming greatly shocked almost before the operation is begun, as a result of the depressing influence of the anesthetic. This does not seem to be wholly dependent upon the condition of the circulation or of the renal secretion. Other and less frequent causes of fatal termination are embolism, ileus, and tetanus.

542. After-treatment.—The after-treatment of operations for the removal of fibroid growths does not differ in a marked degree from that of other abdominal operations. The greater injury and the amount of shock require, of course, more careful consideration and attention. When the patient has undergone extensive operation, much injury of the pelvis has occurred. If drainage is not practised, it is very desirable to place the patient in such a position as will promote the drainage from that portion of the pelvis most injured into the general peritoneum; so the foot of the bed should be elevated about eighteen inches. This decreases the activity of the circulation in the pelvis, prevents the accumulation of fluid in that portion of the peritoneum least able, from the injury, to take care of it, favors holding away the intestines from the injured surface, avoids unpleasant and unfortunate adhesions, and is capable of affording great comfort to the patient. If the patient has lost much blood and is greatly depressed, hypodermocleisis should be practised or intravenous injections of normal salt solution should be given. Hypodermic injections of strychnin, from $\frac{1}{20}$ to $\frac{1}{30}$ of a grain every two or four hours, of atropin, $\frac{1}{100}$ of a grain every eight hours, and of digitalin, from $\frac{1}{4}$ to $\frac{1}{8}$ of a grain every eight to twelve hours, will be found of service. In greatly enfeebled and shocked patients the limbs should be bandaged as far as the trunk to remove the blood from the less vital structures to the more important organs. Ice suppositories, consisting of pieces of ice some three inches in length, an inch or more in diameter, carefully smoothed and introduced into the bowel every hour, and enemata of strong coffee, normal salt solution, or whisky and peptonized milk may be given. Anodynes are contraindicated, and should be used only when the pain and distress or the nervous phenomena of the patient are so great as to render the unpleasant effects of morphin less injurious than these symptoms. The great thirst following the operation is overcome by rectal enemata. Nothing more than small quantities of hot water should be given by the mouth until nausea has been overcome. If, however, the patient continues to be nauseated for twenty-four hours, vomiting and retching small quantities of material, it is better to give a good draft of hot water to furnish the patient something upon which the stomach can contract. This acts as an irrigation to the stomach and decreases the distress. A Seidlitz powder serves well to wash out the stomach. Hare advises for this form of nausea the administration of acetanilid, gr. ij, and caffein citrate, gr. j, every hour until three doses have been taken. Benefit has also been found from small doses of cocain. I am very partial to tincture of nux vomica, gtt. ij every hour. Vomiting will frequently be allayed by giving the patient an enema of chloral, gr. xxx, in warm water, f℥ ij. This brings about sleep and allays the nervous irritation. If the patient vomits continuously, regurgitating large quantities of dark greenish material, associated with more or less tympanites, the use of the stomach-pump is indicated; the stomach is washed out with a normal salt solution until the water returns clear. When the patient has had several days of this condition, follow the cleansing of the stomach with a hypodermic injection of morphin, gr. $\frac{1}{8}$ to $\frac{1}{4}$. Tympanites should be treated actively; if not relieved by irrigation of the stomach, give the patient an enema, as suggested by Keith, of:

℞. Quinin, ... gr. vj
Whisky, ... f℥ ss
Water, ... f℥ ij.

Repeat this dose every hour for three doses. It stimulates the nerve centers, produces increased peristalsis, and favors the expulsion of gas. When tympanites occurs the second day, in a patient who has otherwise been doing well, the following enema should be given:

℞. Magnesii sulph.,
Glycerin.,
Aqua, ... āā ℥ j. M.

and later an enema of soapsuds, containing turpentine ʒj, beaten up with the yolks of two eggs and strained before being added to a quart of soapsuds. These measures failing, the patient should be given a hypodermic injection of strychnin every two or three hours, and repeat the irrigation of the intestine later. The patient should be placed upon her side, preferably the right, with the hips or the foot of the bed elevated, and a large quantity of a stimulating enema permitted to run into the bowel. When the patient's stomach will permit of its administration, give:

℞. Magnesii sulph., ... ℥ j
Acid. sulph. dilut., ... fʒ j
Syr. zingiber., ... fʒ vj
Aq. cinnam., ... ad f℥ iv. M.
Sig.—f℥ ss every hour.

If this is vomited, substitute:

℞. Hydrarg. chlor. mit., ... gr. ¼
Sodii bicarb., ... gr. v.
M. ft. pulv.

to be continued every hour until gr. ij of the calomel are given. Generally, free evacuation of the bowels is sufficient to relieve the unpleasant symptoms, and the patient may then be gradually fed. When the nausea and vomiting persist for two, three, or more days, and the patient becomes greatly weakened and depressed, nothing should be given by the stomach, and rectal feeding should be practised. In such cases it is important that the time for the removal of the sutures should be delayed. The long-continued disturbance interferes with the general nutrition and the processes of repair. The removal of the sutures early, or at the usual time, endangers the separation of the wound, because the processes of repair have been interrupted. In such a patient I removed the sutures on the eighth day, and the entire length of the wound split open as a result of a slight cough. Ordinarily, the sutures can be removed at the end of the eighth day. The patient should be confined to bed for fully three weeks, especially when a large incision has been made and the tumor was large. After the disturbance of the digestive tract has been removed, the feeding should be generous, exercising care to avoid indigestible food.

543. **Puerperal Tumors.—Physometra.**—An unusual form of enlargement of the uterus, causing the apparent presence of a tumor, is the condition just named, which is an accumulation of gas in the interior of the uterine cavity. This affection may be produced during the puerperium or without it. After the woman is delivered the uterus is large and air will enter it. If expulsion is delayed by contraction of the organ, in the course of the convalescence the placental fragments or retained portions of membrane undergo decomposition, and produce a putrid gas, which, by larger accumulations in the organ, produces the condition known as physometra. It may develop in the nonpuerperal condition, as is well indicated in the following patient, as cited by Auvard: A negress, forty-six years of age, reached the menopause and presented considerable abdominal enlargement. Her periods had not been seen for three months. According to her calculation, she was certainly pregnant. The term had passed four months; she called a physician and arranged that he should attend her in labor. Under an attentive examination of the patient to determine the cause of the uterine enlargement the hysterotome was introduced into the cavity of the uterus, when, in less than a minute's time, with great impetuosity, an offensive gas was driven out. After this evacuation the uterus returned to its normal proportions and the patient recovered. In the acceptance of this condition we must admit the possibility of the secretion of gas in the uterine cavity, or the putrefaction of retained intra-uterine debris, after the occlusion of the cervical canal. Decomposition of the debris results in the formation of gas and the distention of the organ. The treatment consists in the establishment of the permeability of the canal.

544. **Hydrometra** is due to any cause by which the internal orifice of the uterus becomes closed and the secretion retained in a woman who suffers from amenorrhea or in one suffering from endometritis after the climacteric has occurred. It practically produces a mucometra, or, when the liquid is serous and clear, it is denominated hydrometra—a term under which is included all seromucous uterine collections. If the endometritis is purulent, we have a pyometra. Hydrometra is exceedingly rare.

545. **Hematometra** is an accumulation of blood in the interior of the uterus, and has been described under malformations. A woman sixty years of age came under my observation with a history of having a very profuse offensive discharge. The discharge was so offensive that it was believed the condition must be malignant. The uterus, not very large, was removed, and upon careful examination it did not present the slightest indication of the presence of malignant disease. The woman had been suffering from an endometritis, which had resulted in the production of large quantities of purulent fluid in the uterine cavity.

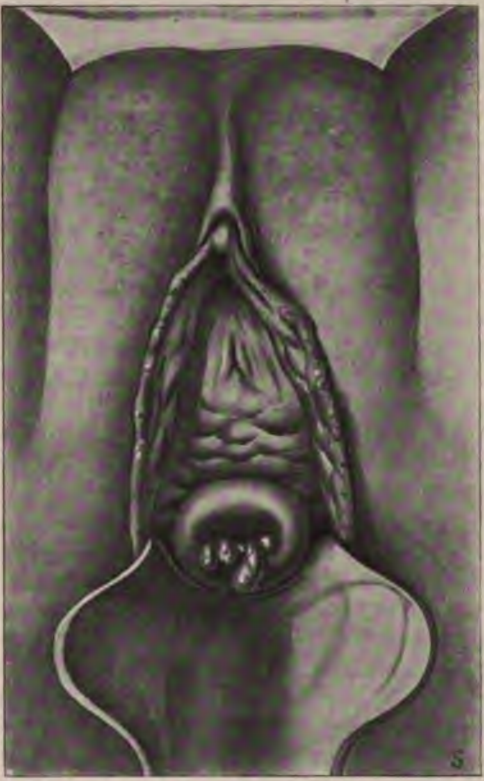

Fig. 471.—Mucous Polypi.

546. **Hydatid Cysts of the Uterus.**—The condition called hydatid cysts of the uterus is, however, free from the presence of hydatids. There are a large number of cysts, which form in the mucous membrane of the uterine cavity—a condition which generally follows labor or abortion, and is known as cystic mole. It is so closely associated with the condition known as deciduoma malignum that its consideration will be postponed until the discussion of the latter disease.

547. **Mucous Polypi of the Uterus.**—These are growths which arise from the uterine mucous membrane, and are distinct from the fibroid polypi, with which they are often confounded. The latter arise from the muscular wall and push before them the mucous membrane. The former result from hypertrophy of the glandular structure of a limited portion of the uterus, which cause them to push out and form a polypoid growth. A number of

these may occur within the cavity of the uterus and interfere with the performance of its functions. They are associated with endometritis. They are due to a localized inflammation and hypertrophy of the glandular tissue. These growths may vary from the size of a filbert or less to a growth consisting of a grape-like cluster of glands attaining the size of a small orange, which is extruded from the cervix, and hangs by a pedicle from the uterine cavity. These growths may occur upon any part of the mucous membrane; frequently they arise from the cervix and protrude from the os in small masses. The treatment of these growths is the same as that of the inflammation with which they are associated: thorough curetment of the uterus; removal of the growths; disinfection and sterilization of the uterine canal and gauze packing to promote subsequent drainage. The operation should not be devoted to the removal of the growths alone, as the cervical canal is likely to become irritated and cause subsequent pelvic inflammation.

Another form of uterine tumor is *placental polypus*, which consists of a mass of coagulated blood, in association with a portion of the placenta or the decidua, which hangs by a pedicle from the uterine cavity and acts as a source of irritation until its removal. The mass becomes compressed in the uterine cavity and forms a firm growth, which can subsequently become partly organized, or, under the influence of insufficient nutrition, may become decomposed, and cause putrid intoxication. The treatment will consist in the thorough removal of the growth. This can be done with the finger, or by the introduction of forceps, which seize and twist off the tumor.

548. **Malignant Tumors.**—By malignant tumors we understand those which can severely injure or arrest the life function of the organism. But this definition is not complete, for the reason that it would include a myoma from which the patient suffered hemorrhage, or which produces compression of the ureters, resulting hydronephrosis, and fatal uremia. A malignant tumor of the uterus, then, is one which destroys the organ in which it originates and penetrates to the surrounding structures without limit to its growth. There is no tissue of the body which is in a condition to offer resistance to the encroachment of so malignant a tumor. Malignant growths are further characterized by a tendency to extend themselves to remote tissues and organs by passage through the lymph- and blood-vessels. Loosened pieces of tissue become washed away from their original sources, and are implanted, affording development to new foci of structure similar to that from which they originated. A further characteristic is that they show a tendency to relapse after re-

moval. The limit between malignant and benign tumors is difficult to fix. Thus, papillary ovarian cysts may rupture and subsequently implant themselves upon and infect the general peritoneal cavity. Syphilis and tuberculosis show a disposition to extend to the surrounding structures and to be reimplanted through the blood-vessels. The cystic mole of the uterus, which is not always malignant, exhibits this power of transplanting itself by particles or emboli through the blood-vessels. These growths, however, when the original source is removed, do not show a disposition to relapse, and the secondary transplantation not infrequently disappears.

549. **Classification.**—We are equally at a loss to fix a proper standard when we come to the classification of these growths. The clinical properties are not sufficient for a classification, as we find, in growths of dissimilar origin, similar clinical phenomena. We divide the growths, however, into two great classes—carcinoma and sarcoma. Carcinoma originates from the epithelial tissue of the surface and the glandular structure; sarcoma arises from the connective tissue. A third group of malignant tumors are the endotheliomata, which arise from the endothelium of blood- and lymph-vessels. Another special kind of malignant disease is that which originates in the chorionic villi, and is known as deciduoma malignum, which takes its origin from the syncytial epithelium of the chorionic villi, and develops only in the uterus in which pregnancy has recently existed. Carcinoma is distinguished from sarcoma by the fact that it develops from the epithelial tissue, and consequently has a distinct stroma or alveolar structure in which it is embedded. The sarcomata, on the other hand, arise from the connective tissue, and exhibit a uniform appearance and are without an alveolar structure.

550. **Carcinoma of the Uterus. — General Pathology.** — By the term carcinomata of the uterus is understood growths which take their origin from the epithelium of the mucous membrane or from the glands covered with epithelium. We have in the uterus two forms of epithelium from which the disease may originate—flattened pavement epithelium of the vaginal portion of the cervix and the cylindric epithelium of the mucous membrane of the cervix and body of the organ. The glands of the mucous membrane are covered with epithelium, which shows but trifling variation between the cervix and body.

1. The carcinoma originating in the pavement epithelium affects the vaginal portion of the cervix—the portion called by the Germans the portio vaginalis. The disease begins in the deeper layer or the rete malpighii, and sends solid processes into the subjacent structure. From the various anastomotic forma-

tions a network of thick cords is produced, which penetrates the tissue. These cords or cones result in collections of polymorphous cells, which are either placed over one another or lie cylindrically, arranged together like an onion peel, forming what are known as epithelial pearls. The thickening of the epithelium affects only the deeper layers, while the superficial layers become so thinned that the papillæ not infrequently lie free, in an irritated condition. In the center of the cone, as a result of fatty degeneration or of colloid softening, spaces occur, which are similar to the lumen of gland tubes.

2. The cylinder-cell cancer of the uterus, which arises only from the cylindric epithelium of the glandular form. It is probable that cancer never originates from the unaltered covering epithelium of the uterine surface. The pure cylinder-cell formation arises from the glands, and occurs in two incidentally different forms. In the one form the high cylindric epithelium is lower, cubic, roundish, or polymorphous, while the nucleus moves out from its original basal situation toward the single cells, and at the same time begins to increase toward the lumen of the gland and to fill up its cavity until the lumen is brought to complete closure. Sometimes proliferation toward the lumen occurs and the growth progresses outward, breaking through the membrane, after which the uterine body is penetrated in all directions. In another form, which is more rare, the gland lumen is filled out by a solid cone, which furnishes a form difficult to differentiate from the pavement epithelial cancer. This form arises from the glands of the cervix and body as well as from the erosions. Individual changes in the cells consist in the loss of cilia and the change of situation of the nucleus. In the early stage the cells in the body and cervix retain their characteristic activity and the situation of the nucleus, so that one can still regard in this form the point of origin of the carcinoma, whether in the cervix or body. The rupture of the membrana propria and the branching-out of the epithelial layer in the uterus in all directions result in the disappearance of the normal form of the gland and the beginning of epithelial cell layers. The stroma in such cases can be completely absent; in others, it is retained in large processes. This form of cancer occurs frequently in the uterine body, quite rarely in the cervix, and very rarely in the vaginal portion. In later stages there is a partial or complete filling-out of the lumen with the epithelium under simultaneous alterations of form, which process develops a pure glandular cancer. This form of glandular cancer has been denominated by Ruge adenoma malignum, which he endeavored to distinguish from the pure glandular cancer. This, however, can not be ad-

mitted, for, in the first place, it must be remembered that an adenoma is a benign new formation, while the condition under consideration is by Ruge correctly denominated pure cancer, for it destroys locally and generally. A malignant adenoma, then, is nothing more than a glandular cancer. The cells of carcinoma are not specific, but more or less closely resemble the cells of the uterus, from which the carcinoma has originated. These cells, of course, undergo certain changes according to the manner in which they are crowded together, but still in their polymorphous forms resemble the cells from which they have originated. In the cervix we can have mixed forms of disease, owing to the fact that the condition has originated in glandular structure everted from the cervical canal.

551. Structure of the Stroma.—The stroma of uterine cancer is formed from the structure of the portion in which it has developed. If the cancer progresses outward toward the surface of the portio vaginalis, the stroma also grows outward, and forms structure in which the alveolar carcinoma lies. In the infiltrated cancer the stroma of the organ itself forms the basic substance; thus, in cancer of the vaginal portion, and in that of the cervix, we find the stroma consisting of connective tissue and muscular structure, while in carcinoma of the body it arises from the pure muscular structure. The quantity of stroma differs variously. In single forms of cancroid, as well as in the pure glandular cancer, we have great stroma beams, while in many carcinomata of the cervix the base-substance is so thin that the alveoli almost touch. This is particularly striking in the carcinomata adenomatosum, in which the epithelial structures of their base surfaces lie thickly together. Secondary alterations in the stroma, such as fatty and hyaline degenerations, are not infrequent. In the pavement cancer the cervical glands become involved secondarily, and the disease progresses upon the cervical glands from the outside in, until the lumen is broken. Experience demonstrates that the blood-vessels are slow in being involved in carcinoma. Metastasis by them is very rare. Seelig pointed out that the capillaries remain for a long time intact between the existent carcinomatous projections. Once he saw the carcinoma had collected in a ring around the vein and had invaded its wall up to the intima. Goldman, on the other hand, observed penetration of carcinoma through the thin walls and alterations of the endothelium, while the circulation was disturbed by thrombosis formation, so that the possibility of carcinomatous masses being carried through the blood stream must not be disregarded. The principal method of extension of carcinoma from the primary infection is by the lymph-vessels. The carcinoma cones shove out into the connective-tissue folds until they gradually attain large lymph-spaces in which a distinct endothelial covering exists. When the cancer reaches one of these lymph-spaces, it rapidly extends itself in the organ. The more rapid developement of cancer in pregnancy is due to the size and width of the lymph-spaces, and in childbed to the energy of the circulation. In senile women the vessels are narrow and the lymph-vessel activity is trifling; consequently the extension of the disease is very slow.

In the cellular infiltration of the deeper structures the lymph-spaces are opened and rapidly filled. Seelig, in his careful investigations upon the progress of the disease, noticed the projection forward of carcinomatous masses, which, with the endothelial-covered lymph-vessels, could obstruct the large vessels with these masses, and the vessels are still recognized in the structure. The largest lymph-spaces filled with carcinoma were found in the margin between the middle and peripheral muscle-layer of the corpus uteri, where the entire muscular branches anastomose vertically. The investigation demonstrated that the carcinoma presses against the connective tissue or muscle-fibers until it invades the lymph-spaces lined with the endothelium. When the smaller lymph-vessels penetrate transversely and anastomose with

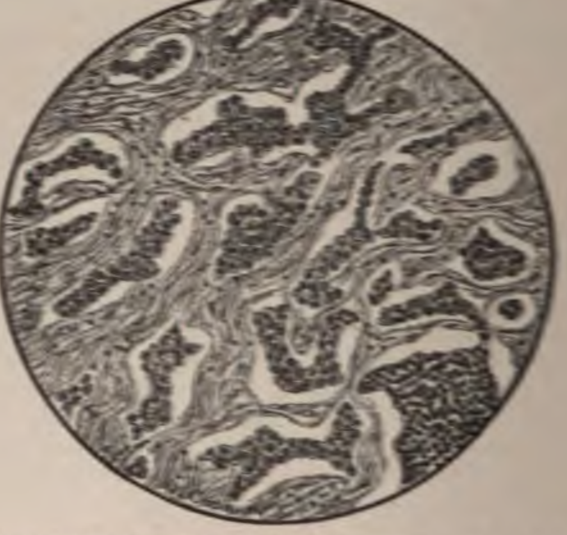

Fig. 472.—Glandular Carcinoma of the Uterus (Primary). (B. and L. ⅙ in. Obj.; 1 in. Oc.)

those of the body, the carcinoma extends by larger paths into the parametrium, where the lymphatics are not infrequently found filled with carcinomatous masses. Frequently the carcinomatous masses are carried from the lymph-spaces as emboli, in the next lymph-glands, without the vessels themselves being involved. While it is generally recognized that the principal channel of invasion is through the lymph-vessels, yet it is a well-demonstrated fact that in malignant disease of the uterus the lymph-glands are much less rapidly involved than in any other form of cancer. The recent investigations of Blau and Dybowski have particularly emphasized the infrequent involvement of the lymphatic glands in women who die from cancer in the Berlin Charity. The former found the lymphatic glands of the pelvis involved but thirty times in ninety-three sections, while the latter, in a hundred and ten cases, found only ten involved; while the retroperitoneal showed involvement in fifteen, and of twenty-four observations on the lumbar glands, they were diseased fourteen times. In cancer of the cervix Blau found the lymphatic glands involved in scarcely one-third of the cases. Glandular involvement occurs much later in uterine cancer than it appears in other

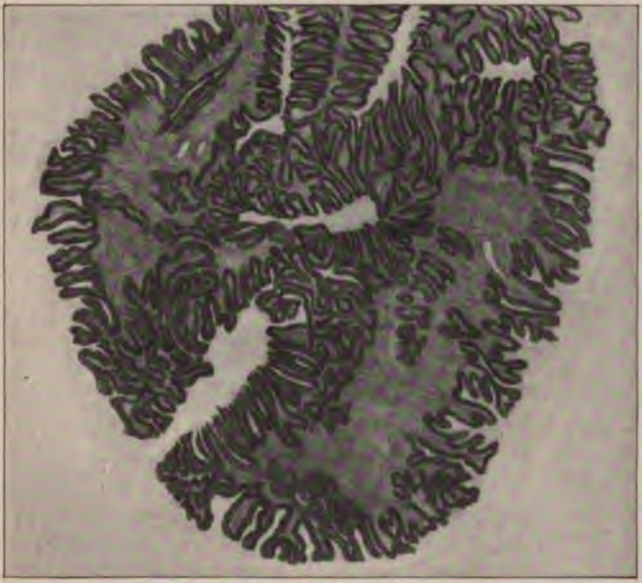

Fig. 473.—Glandular Cancer.

organs. This is evident from the manner of relapse after many operations, for in the majority of cases the disease is found to recur at or near the site of removal.

552. **Influence upon the Surrounding Tissues.**—The generation of malignant infiltration results in a reaction in the tissues environing it. The most striking is in the form of small-cell infiltration. This reaction is either an actual inflammation, caused by infection from the surface of the suppurating cancer, or is produced in the uterine walls by the pressure of the cancer structure. The reaction zone envelops the alveolar structure of the cancer, frequently covering it over so that the leukocytes press into the alveoli. In one case of cancer of the cervix Auer observed a distinct thickening of the portio epithelium without its taking on a malignant character. The same condition is observed in alterations of the mucous membrane in the body and cervix exhibiting various forms of chronic metritis.

553. **Special Pathology.**—According to Ruge and Veit, uterine cancer is divided, from its point of origin, into cancer of the vaginal portion of the cervix or of the body of the uterus. The epithelioma or cancer of the vaginal portion of the cervix does not originate in the pavement epithelium, but in the deeper tissue or newly formed glands which are found in papillary erosion. The disease, which originates outside the cervical canal, develops outward toward the vagina and parametrium. In its earliest clinical aspect the disease may be found to have originated in one of three positions: First, as small nodules, deep in the vaginal portion, with unbroken squamous epithelium. Second, as a shallow ulcer on the vaginal surface, due to origin of the new growth. This erosion extends toward the vagina, and never, or scarcely ever, upward through the os. Third, as a nodule or nodules within the os externum, beneath the mucous membrane, which is subsequently penetrated, producing a necrosis.

As a result of eversion of the cervical canal, associated with lacerations, we may have a cancer of the portio, which is supplied with cylindric epithelium. This tissue, however, has, as a result of inflammatory conditions, previously undergone a metaplastic change of its epithelium, so that it closely resembles that of the pavement epithelium. It is only when the disease has originated in the racemose glands of the part that we find the cylindric epithelium constituting the greater part of the disease. Williams was inclined to believe that the tissue forming the line of junction between the pavement and cylindric epithelium at the external os was the point most vulnerable to the development of malignant disease. Limbeck describes a course of development of the disease in which there is a combination of pure glandular cancer with pavement epithelial cancer, so that the solid cancer cone of the former variety is encompassed and held for a time by the pavement form.

554. Clinical Forms.—While from a histogenetic standpoint we determine various kinds of cancer, we do not find that they produce determined clinical forms. The latter depend upon other conditions. The cancerous formation of epithelial masses may break down upon the surface or in the center. It can project from the portio vaginalis into the lumen of the vagina, while simultaneously the connective tissue of the portio is taken up in the stroma and can be penetrated to its depth by cancer masses. This most frequently develops itself in the portio carcinoma, above the level and toward the lumen of the vagina, which creates a superficially situated tumor, which is known as a cauliflower growth. This lies as a more or less roundish polypoid tumor in the vagina, which may completely distend it and present a tumor of fist-size, which becomes more contracted as we approach the healthy structure. Upon the surface of the cauliflower, after desquamation of the pavement epithelium, the carcinomatous masses are

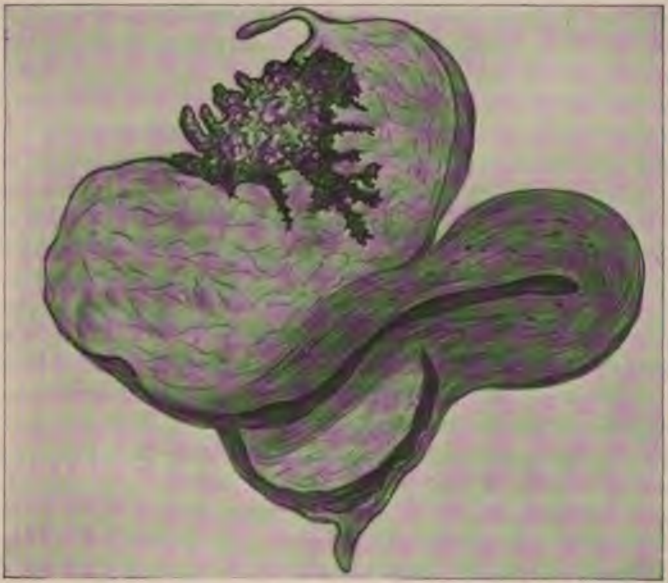

Fig. 474.—Cauliflower Growth Involving the Vaginal Part.

exposed, and create an irregular or papillary condition. In longer duration of the disease, with unfavorable nutrition of the interior surface, the masses become necrotic and the cauliflower growth is covered with a gray, greenish, smeary mass. The most frequent origin of such growths is the posterior lip. Not rarely the disease arises in one commissure, and extends from it to the lip. In rare cases the entire portio vaginalis is simultaneously degenerated. In other cases processes of epithelial growth project into the substance of the portio, and in deep infiltration there is thickening of one lip or commissure. In rare cases the entire portio vaginalis is involved and the more affected lip grows toward the lumen of the vagina. This form differs from the cauliflower growth through the polypoid form, and by the mucous membrane drawn over it, which is rarely quite intact. More frequently it is thrown off in superficial layers. Very soon this form is followed by a disintegration of the surface of the infiltration, or it begins in the center and opens through the infiltration to the outside. In this manner a smooth funnel or fissure will be formed, with jagged, often undermined borders, sharply lying toward the circumference, and always under the level of the healthy surroundings. In such a fissure an ulcer will sometimes dissect deeply into the portio. Movable polypoid tumors will be found projecting into the ulcer or around the cervical canal without special alteration in the canal itself. Occasionally, the smooth ulcers are observed similar to the rodent ulcer, which extends to a very trifling depth. Just why such differences should exist in the formation of the disease we are unable to determine.

555. **Process of Extension.**—Ruge and Veit have asserted that carcinomata of the portio, which mostly arise from those parts of the vagina and mucous membrane which cover the cervix, show a tendency to confine the extension principally toward the vagina. Winter describes a form in which the hypertrophied papillary bodies next the carcinoma presented the mucous membrane apparently raw and excoriated. After a certain time this layer became infected and underwent a carcinomatous degeneration. This condition is somewhat similar to the form described by Schwartz as multiple epitheliomata. The upper part of the vaginal mucous membrane consisted of soft, spongy, easily broken down growths, which presented a fine papilla-like surface to the vagina. Microscopic investigation showed a pure hyperplasia of the vaginal epithelium, without carcinomatous degeneration.

Most frequently the portio cancer develops as an infiltration in the depth of the structure, covered by intact vaginal mucous membrane, and forms an infiltration ring of extensive ulcerous destruction, which seizes the entire affected part of the vagina. The disease extends into the supravaginal connective tissue. Occasionally, we observe contact carcinoma in which the mucous membrane becomes infected from the carcinoma over which it lies. The more rare form is the metastatic disease of the vaginal mucous membrane, in which isolated, often multiple, knots of a bluish appearance arise in the vagina with a special predilection for the posterior wall of the urethral eminence. These thick knots beneath the intact mucous membrane may involve the urethra, and soon break down. The extension of the disease to the uterus is no exception. The extension is likely to be more rapid, however, when the involvement of the cervix is of the mixed form, when, from eversion of the cervix, through laceration the glands become infected. If the disease extends toward the vagina, it may involve its anterior wall. The disease shows a distinct tendency to invade the paravaginal tissue laterally and posteriorly. In the connective tissue are found masses inclosed in the large lymph-spaces, which are extensively infiltrated. The uninvolved connective tissue is scarcely healthy, but shows inflammatory thickening and swelling, into which cords project which can be an expression of the inflammatory reaction to the carcinomatous disease.

Bladder and Ureters.—The bladder is involved only when the disease affects the anterior lip, and then only if it has passed into the anterior vaginal fornix or if it has reached the same through the vesicocervical septum. Disease of the bladder occurs only when the cases are far advanced. The first alteration in the extension to the bladder consists in the folds becoming thickened and swollen, lying parallel to one another, with deep intervening valleys. The mucous membrane may be raised in small vesicles, associated with which is a deep catarrhal alteration of the mucous membrane. Carcinomatous nodules, from the size of a pea to that of a walnut, appear in the trigonum later. Such nodules appear in the internal orifice of the urethra, and incidentally in the mouths of the ureters. Blau found in one case that the entire mucous membrane had undergone an infiltration, from direct implantation, in the form of nodules and papillary growths. As these masses disintegrate, fistulous ulcers result, which have a cancerous infiltrated border. These alterations can affect either the bladder or the ureteral openings. The most dangerous innovation is when the mass involves the ureter, and may grow around and compress it. I have frequently seen the involvement of the structure about the ureter cause compression and dilatation of the portion above until the ureter becomes larger than the finger and the cavity of the kidney is sacculated. As the disease progresses nodules project into the wall of the ureter and cause its involvement and further contraction, until, when both canals are involved, the passage of urine to the bladder is greatly obstructed. The involvement of the lymphatic glands has been mentioned as of late occurrence. The glandular chain which is most likely to become involved in cancer of the portio vaginalis is a collection of two or three lymph-glands which is situated before the sacro-iliac articulation, beneath the entrance of the pelvic plane, at the division of the common into the external and internal iliac arteries. From this situation the lymphatic anastomosis may carry the disease to glands in other portions of the body. Petit observed a pigeon-egg-sized diseased gland in the region of the supraclavicular gland in an inoperable cancer of the cervix. Dybowski found inflammation of the mesenteric, bronchial, renal, lienteric, mediastinal, jugular, cervical, and supraclavicular glands when the disease had originated in the uterus. Whether the infection in these cases has been carried through the lymph- or blood-vessels is undetermined.

556. Carcinoma of the Cervix.—Cancer of the cervix comprises the involvement of that section of uterine mucous membrane situated between the external and the internal os. This does not include the cancer which arises from erosions and ectropion of the cervical mucous membrane, which very soon assume the clinical form and appearance of the cancer of the portio. It is a question whether cancer of the cervix arises from the cover epithelium. It is positively denied by Williams, while Amann attributes it to the atypic proliferation of the cover epithelium, and regards the glandular alteration as secondary. Winter is inclined to believe that most frequently the disease arises from a combined point of origin of glandular and cover epithelium. In the glandular variety the cells become anaplastic and polymorphous, and fill out the alveoli. Gland tubes are mostly thin and without much lumen. In other cases they become cystic. It is a question whether the involvement of the glands in these cases is a benign or a malignant condition. This must to some degree be determined by the destruction of the patient by a relapse after extirpation. The observation that in the atypic growing epithelium or cervical cancer colloid degeneration can appear is valuable. In such a cancer from a gland polypus a gelatinous degeneration had appeared in the external layer of the alveoli, and the centrally situated cells were surrounded with a gelatinous crust, while no more cell elements were found in the alveoli. Cases have been observed in which there was an abundant mucous colloid separation of the carcinomatous surface.

Cancer of the cervix presents itself in a number of ways.

Thus, it may originate and develop toward the cervical cavity; at other times, in the cervical tissues, it is concealed behind the external os; or, in an open uterus, when accessible to the finger and eye, the chief interest is to know whether the new growth or its destruction predominates. Thus, it may appear in the lumen of the cervical canal, in the form of tubercles, nodules, and papillary growths, which may be entirely extruded from the cavity, while the surface of the cervix is only superficially seized. In other cases extensive infiltration of the diseased mucous membrane immediately within the cervix penetrates the entire periphery and produces thickening of the whole cervix or of only the infected wall. Again, the infiltration begins as a circumscribed nodule, in the depth of the wall, which can not, in general, be recognized. Cancer with pure infiltration is rare. Most generally there is a disintegration of the new formation either upon its surface or in the central or deeper part. When the ulcer begins upon the surface, the superficial layers are thrown off; the size of the cervical canal is increased, while the periphery is thickened by more or less infiltration. This process can be blind upon an uninvolved external os, or it may form a cavity accessible to the finger. If the infiltration involves only one wall, breaking-down may create a fissure or a more or less wide cavity, whose entrance is directly into the cervical canal. The ulceration extends higher, and may divide parts of the inner wall which project free into the cavity. Melting down of the carcinomatous tissue

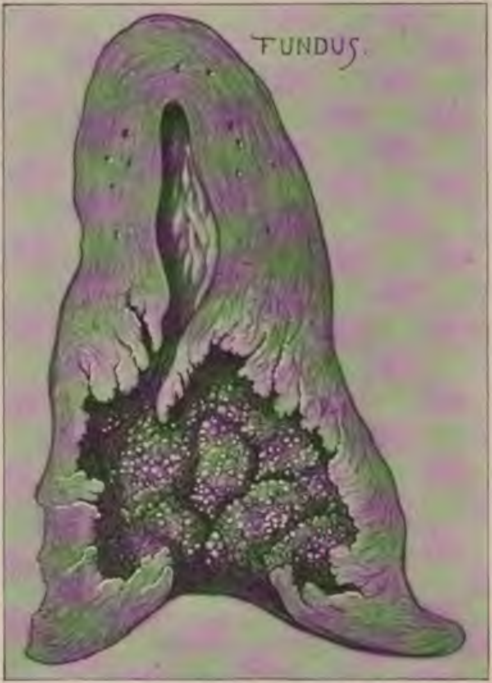

Fig. 475.—Cancerous Ulceration of Intracervical Canal.

may lead to cavity formation, which gradually proceeds externally, and opens the cervical canal by a fissure of considerable breadth. In this way a good part of the cervical wall is lost.

The method of extension in cervix cancer differs incidentally from that in the portio. It is to be conceived as a true uterine cancer, has the most tendency to grow upward and into the connective tissue, while it involves the portio vaginalis and vagina late, if at all. These principles, enunciated by Ruge and Veit, have been confirmed by later investigations. Extensive degeneration of the cervical canal may thus occur, without any ulceration opening upon the portio vaginalis, which remains completely intact without a break in its pavement epithelial covering. Metastasis may take place in the vaginal mucous

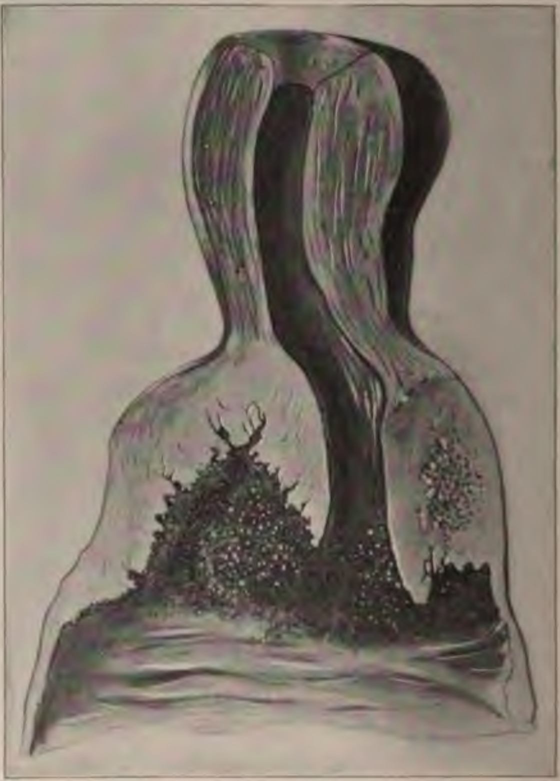

Fig. 476.—Cervical Wall Infiltrated while the Vaginal Portion is Largely Destroyed.

membrane, but the principal direction of the extension in cervical cancer is toward the body of the uterus. It not infrequently passes over the external os, involving the mucous membrane of the body. The disease may extend over the entire uterine surface or only a smaller part of the cavity may be left uninvolved. In another form of disease the mucous membrane of the body and of the cervical canal is the seat of isolated cancer nests which result from metastasis. As the disease extends, the thin layer of connective tissue between the posterior cervical wall and the peritoneum is rarely involved. The vesicocervical septum becomes much more frequently diseased, so that disease of the bladder is not infrequently added. Much more frequently in the cancer of the cervix than in that of the portio do we find the posterior wall and the enveloping peritoneum involved. Peritonitis may result from perforation, or inflammation and breaking-down may cause the formation of suppurative peritonitis. With the extension of the disease forward into the uterovesical septum, the bladder-wall and ureters become involved, and cause conditions similar to those described in portio cancer.

557. **Carcinoma of the Body.**—Carcinoma of the body arises from the epithelial elements of the mucous membrane and from the superficial epithelium of the glands. We may have considerable difficulty in determining whether the disease has originated from the cover or glandular epithelium. This distinction is only from a histogenetic standpoint, as there is no morphologic difference. The cancer arising from the covering epithelium can show glandular form, while the glandular epithelial cancer can completely lose this by the falling-out from the alveoli of their glandular cells. It is doubtful whether the cover. epithelial cancer ever arises from the unaltered cylindric epithelium, but exists after metaplastic alterations have occurred. As a result of previous inflammation the cylinder-cells become cubic, stratified, and present a similarity to the pavement epithelium. They may preserve throughout a glandular character, while in the center they show a distinct lumen, and in the border many stratified cubic cells, which sink beneath the cover epithelium, solid cones, and are filled out by cubic cells resembling the cancroid of the vaginal cervix. Not infrequently the cells are arranged in concentric layers,—pearls, onion shells,—so that complete cornification results, with the characteristic microchemic reaction. This form has been called horn cancer.

In the examination of the structure it is found that the centrally situated cells are polymorphous and cubic, while the peripheral long retain a cylinder type. The extension of the gland cancer in the deeper structures follows from the situation of the tubes, which project between the muscles and fibers, press them from one another, and thus advance in the continuous-like growth toward the periphery. The gland tubes, thus, under support of their lumens, may grow through the muscular structure, and later become carcinomatous. This form of gland cancer is that represented as carcinoma adenomatosum, in which the gland tubes grow through the muscular structure and remain, while in the older layers, in the filling-out of the alveoli, transformation of the pure cancer begins. This process does not cease its progress unless extirpation of the uterus occurs. Kaufmann described a form of carcinoma of the body which occurs simultaneously in various kinds of epithelium, as he observed one in which pure gland carcinoma was combined with horn cancer. The cones of the latter are between the generative gland tubes in some places, while in others they were found isolated horn cancer cones.

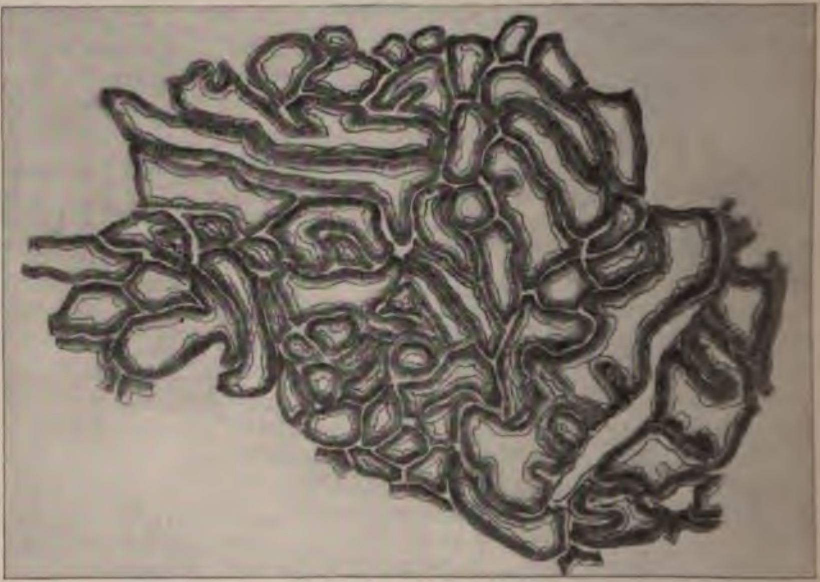

Fig. 477.—Adenocarcinoma.

Cancer of the uterine body appears either as a diffuse condition, with simultaneous disease of the entire endometrium, or is more frequently circumscribed, when large sections of the uterine cavity are left undisturbed. In the diffuse form its papillary projections, villi, and nodules fill out the entire uterine cavity. Carcinomatous infiltration invades the depth of the muscular structure, and more or less deeply penetrates it. The disease, as it progresses, either goes toward the free surface and fills out the uterine cavity, while the depth of the infiltration is trifling, or the carcinoma penetrates the entire uterine wall, with but slight growth toward the surface. Just why the disease should thus manifest itself is undetermined. In the circumscribed form is often found a tumor with a roughened, uneven surface, the shape of which depends upon the size of the uterine cavity. On the base of this growth infiltration extends more or less deeply into the uterine structure. Pure infiltrated cancer in a circumscribed form is rare. Not infrequently it is seen as a form of polypus with a very small pedicle, from which a considerable sized, spongy nodule may fill up the entire uterine cavity. The appearance of such a growth might lead one readily to suppose he had to deal with a polypoid growth of benign character. The removal of the mass, however, is rapidly followed by redevelopment, and, possibly, more rapid progress, from the infection of the injured tissue.

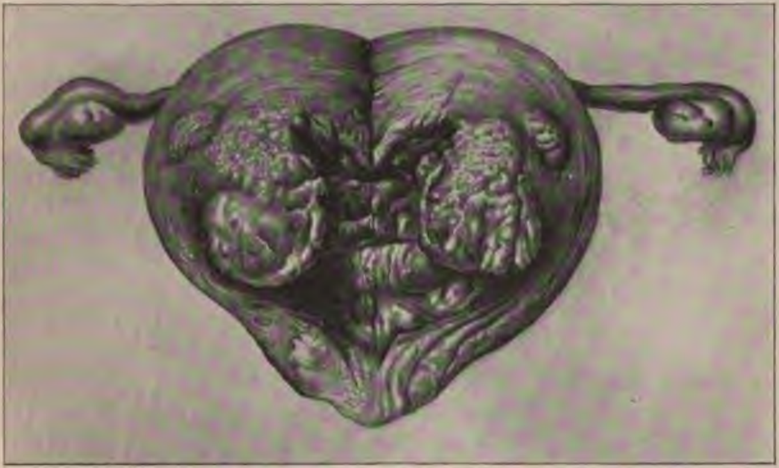

Fig. 478.—Diffuse Cancer of Uterine Body.

Influence upon the Surrounding Tissues.—With the development of malignant inflammation in the wall of the uterus there is at once produced an irritation in the surrounding tissues, which results in small-cell infiltration and throwing-out of inflammatory products, and forms an attempt at a barrier against the further progress of the disease. This condition produces a certain amount of metritis and endometritis in every case of cancer of the uterus. The disease extends beyond the uterine walls and develops secondary nests, from infiltration in the parametrium, and particularly in the cellular tissue, between the neck of the uterus and bladder, from which soon there is an extension to the bladder-wall and to the ureters. Extension through the wall, if upon the peritoneal surface, results in adhesions, by which the surrounding viscera become glued to the surface of the uterus. These adhesions may involve the bladder, omentum, or intestine. Such a nodule, subsequently degenerating, can cause an intestinal fistula.

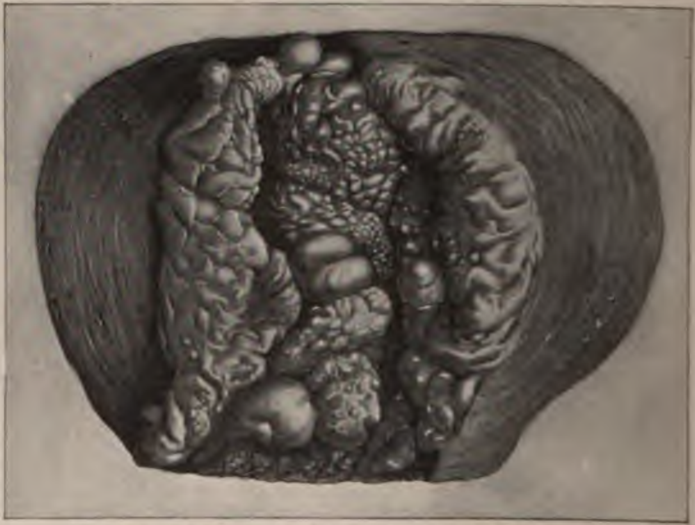

Fig. 479.—Entire Cavity Covered with Nodular Growths.

Secondary infection in Douglas' pouch may produce a large tumor and fill this cavity. Glandular infection is first directed to the retroperitoneal lumbar glands about the bifurcation of the common iliac from the aorta, although, as we have seen, the glandular infection is a late element in the progress of the disease. Metastasis to the abdominal viscera is much less likely in cancer of the body than in that of the cervix. It is not unusual to find malignant disease of the uterus complicated by benign ovarian tumors, or we may find associated cancer of the ovary. This is more common than when the disease originates in the cervix.

558. Etiology.—Of the causes of malignant disease we have as yet no definite knowledge, and are forced to accept that theory which affords the most plausible view of its development. Among some of the more important theories as to its development are Virchow's, that while cancer is of epithelial origin, it is only through metaplasia or mesodermal elements that it originates; in other words, a transformation of the connective-tissue cells. Cohnheim advocates the theory that it was transmitted from embryonic carcinoma germs. Riberts believed the epithelial cells separated from their connection without anaplasia; Thiersch and Waldeyer, that by primary growth of the epithelium, without alterations of biologic properties of the epithelial cells. All agree that there is no distinctive cancer cell.

In recent years the possibility of its origin from micro-organisms has been advanced. Klebs presented a bacillus, but later investigations have failed to confirm its existence. The presence of cancer results in the development of micro-organisms of various kinds, just as we find in other inflammatory processes, but none which can reproduce the disease. Various degenerative processes in the cells have been indicated as possessing parasitic elements, only to be proved untenable. Schwarz has most convincingly demonstrated that the majority of cell conclusions favoring the parasitic theory resulted from degenerative processes of the epithelial cells, leukocytes, or their derivatives. Hauser directs attention to the lack of analogy between the various infective diseases and the development of malignant processes. A fundamental biologic difference exists in that, with the latter, a further extension of the processes in the organism is influenced by the cells, and there is absolutely wanting any proof of isolation

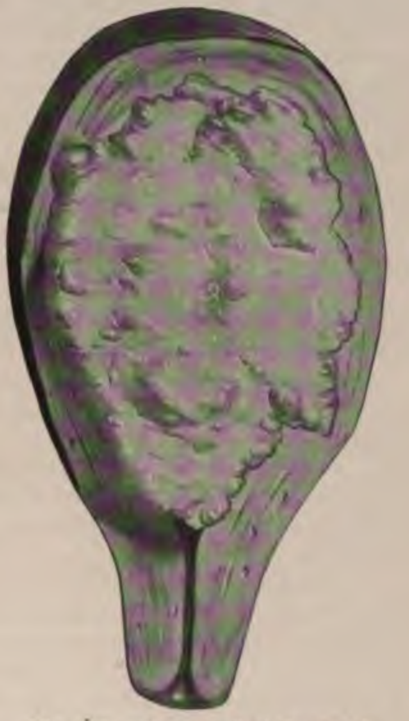

Fig. 480.—Circumscribed Cancer of Body of Uterus.

of the parasite from which the disease can be generated by its employment. The infection of the belly wound in operation has been cited as evidence of such parasitic power, but here it is the transplantation of living cells in a soil favorable for their development. Never has occurred transmission from man to animal or from one animal to another. Surgeons not infrequently injure themselves while operating, but no authentic case exists by which the development of cancer can thus be traced. Evidently, increasing age forms in the cell a disposition to carcinomatous degeneration. Statistics indicate that a uterine cancer before the twentieth year does not occur, and is rarely observed during the next ten years. It is present with increased frequency during the third decennium, but the majority of cases are found in the fourth. Thiersch believed the greater frequency of cancer with advancing age was due to atrophy of the connective tissue, which favored the deeper infiltration of the epithelial tissue, but this is a mere hypothesis.

Heredity.—Inherited predisposition to the development of cancer has been regarded as an important factor, but careful researches by Gusserow showed but 7.4 per cent. favoring such a tendency, while von Winckel found but 6.3 per cent. Inherited lowered resistance to disease, as shown in families predisposed to tuberculosis and chronic renal disease, favors the development of malignancy.

Sex.—Twice as many women suffer from cancer as men. Next to the mammary gland, the disease occurs more frequently in the uterus. According to Hofmeier, fully one-fourth of all cancers are uterine.

Condition of Life.—Cancer of the uterus greatly preponderates in the poorer classes, in whom the feeble nutrition, great toil, and more exacting lives favor degenerative processes.

Sexual Activity.—All statistics prove that malignant disease preponderates in those who lead an active sexual life, especially in the multiparous woman. Gusserow's investigation of a large number of cases gave the average of fruitful labors in cancerously afflicted women as 5.1 per cent.—a proportion of births considerably above the average for women taken together. Accepting the irritation theory of Virchow as a factor, we can readily appreciate the greater frequency of cancer of the cervix. The possibility of cancer of the cervix in the chaste virgin has been doubted, but I have seen several single women of unquestionable virtue who suffered from cancer of the cervix. Cancer of the body of the uterus is comparatively more frequent in unmarried and nulliparous women. The theory that cancer can be produced by excessive coition is not borne out in the lives of prostitutes. Carcinoma may be secondary in the uterus, having originated in the bladder or vagina. Myoma of the uterus is sometimes associated with cancer, but not so frequently as to render it noticeable as a predisposing cause. Landau is inclined to assign syphilis as a predisposing cause, but my observation does not incline me to accept it. Von Winckel's assertion that gonorrhea is an important factor in the development of cancer needs confirmation. With all our investigations we are driven back to irritation as a cause for malignant disease, but its existence does not always determine such a degeneration. We are forced to acknowledge that we do not know why cancer develops.

559. Symptoms and Clinical Course.—Unfortunately, in the early stages no symptoms, either subjective or objective, are present to give warning of the impending danger. As a consequence, the physician rarely has an opportunity to investigate the disease in its early stages. Cancer has no pathognomonic signs; the principal symptoms—hemorrhage, more or less offensive discharge, and pain—are not constant in all cases, and each one may be produced by other than malignant conditions. Bleeding may occur when the cervix is affected, though the vaginal margin may be uninvolved. The quantity of blood may be slight and irregular, as a few drops after straining or coition. In the married, post-coitive hemorrhage is a most constant and suggestive symptom. The amount and duration of the menstrual flow is increased, but not constantly. Frequently the first indication will be a profuse bleeding. After the climacteric an occasionally more or less profuse bleeding will occur at intervals, which causes the patient to think that her menses are returning. Post-climacteric pudendal bleeding should always be regarded as a dangerous symptom until careful and painstaking examination has demonstrated the contrary. As the disease advances hemorrhage becomes more marked. The blood is discharged in a continuous bright stream, or, more frequently, in large clots, which have formed in the vagina. Frequently it is accompanied with a discharge of fragments of disintegrating tissue. The continuous hemorrhage produces marked anemia, promotes the cachexia, but is rarely the direct cause of death. Unfortunately, women generally regard increased and irregular bleeding as a necessary concomitant to the climacteric—a view which is maintained too frequently by the attending physician. On the contrary, such symptoms should always be regarded as danger-signals, demanding most thorough investigation of the genital tract, supplemented by microscopic investigation to ascertain the specific cause. Nothing should be taken for granted or left to chance. No palliative measures or remedies to arrest bleeding should be employed prior to the examination. If the physician is unable to satisfy himself as to the cause, duty to his patient demands that she have the benefit of further consultation.

Offensive discharge is next to hemorrhage in the time and frequency of its appearance. The discharge in the early stage is slimy and serous, without an especially penetrating and offensive odor. As the disease advances and is associated with ulceration and disintegration of tissue, the secretion changes; it becomes yellowish; then, with a mixture of blood and disintegrating tissue, reddish and brownish; and, finally, a dark, smeary mass. At first it has a stale, sweetish odor, becomes more disagreeable, and finally presents an intensely penetrating, stinking smell, alike disgusting to the patient and to her attendants. When patients have suffered from cervical discharge, possibly years before, little attention is given to an increased amount until the disagreeable odor is so marked as to require consideration, when the time for successful treatment has probably passed. Decomposition of the secretion is undoubtedly due to saprophytic or putrescent germs, and the greater accessibility of the cervix causes the odor of its secretion to become earlier affected than that of the uterine cavity.

Pain is a comparatively late symptom. The cervix, as is well known, is not a specially sensitive structure, and the severe pain occurs with the involvement of the parametrium, and is later increased by pressure upon nerve-trunks. In uterine cancer, or when it involves the cervical canal, pain is more marked, and is an earlier symptom, owing to the encroachment upon the internal os and obstruction to the canal. The absence of pain leads many patients to regard the increased bleeding and discharge with less suspicion. Slightly extended nodules near the cervix, by pressure upon the nervous plexuses in the retroperitoneal connective tissue, may produce a lively, persistent boring pain in the depth of the pelvis, which is increased to an extraordinary degree by the slightest extension. It gives rise to persistent lancinating pain, which is not alleviated by continuous rest in bed, and only the persistent employment of narcotics affords any mitigation. As the disease approaches the peritoneal surface the pain is increased, serious reaction to the nutrition is induced, by which inflammatory adhesions with the surrounding structures are the result, and an extensive peritonitis may thus arise. The abdomen is sensitive to pressure, and, according to Schroeder, vaginal examination reveals the uterus surrounded by board-like hardness. Not infrequently the symptoms may be aggravated by compression and narrowing of the rectum through advancing infiltration of the pelvic connective tissue.

The mechanical obstructed passage of fecal masses is generally associated with severe, agonizing pain; obstinate constipation arises, partly from mechanical hindrance, but much more from the desire to avoid the severe pain at stool. In cancer of the neck of the uterus, when the disease is transmitted to the bladder-wall, even before the entire wall is penetrated there is a burning sensation with the evacuation of urine, soon followed by tenesmus, frequent micturition, bloody, clouded, or purulent urine, with persistent vesical pain. With the infiltration and necrosis of the structure a direct communication follows. The admixture of ammoniacal urine with the offensive vaginal discharge aggravates the already lamentable condition of the patient by a horrible stench. The profuse, irritating vaginal discharge produces an extensive erythema of the vulva and inner sides of the thighs, and causes the patient to complain of the intense itching, or pruritus vulvæ.

The offensive character of the pudendal discharge may be aggravated when the disease involves the peritoneal surfaces of Douglas' pouch and is transmitted to the rectum and upper part of the rectovaginal septum, which breaks down and forms a rectovaginal opening. Occasionally, a large cloaca is thus formed, into which is discharged urine and feces, mixed with decaying tissue, and forming a most deplorable condition. Fortunately, the rectum is not so frequently involved as the bladder. Frommel asserts that the fistula of the bladder appears in one-third of all cases; fistula of the rectum in one-sixth. In transmission of the cancerous disease laterally or forward the ureters will sooner or later become involved. The infiltration extends about and compresses their lumens, attacks the structure of the wall, and may finally completely occlude it. So long as the passage of urine remains free, the patient experiences no ill effect, but the compression causes a gradual dilatation of the ureter and pelvis of the kidney; a condition of hydronephrosis follows, and indications of uremia. If but one side is affected, the other kidney does compensatory work, and, beyond a possible sense of fullness and weight in the affected organ, there is but little discomfort. When both organs are compressed, uremic symptoms follow, though never violent, rarely convulsive, and gradual coma is developed, which causes increased indifference to surroundings, and, fortunately, to the profuse pain. Disgust for food is marked, vomiting frequently occurs, and the urine is retained. We are reconciled to the condition by the fact that such patients are relieved by the coma from previously marked pain.

Under the changes in pressure, from the alteration in the infiltration, the caliber of the canal through which the urine passes is restored, the sensorium becomes free, and so remains until new compression symptoms appear. An autopsy frequently discloses, above the cancer masses, dilated ureters, sacculated kidneys, occasionally pyelonephrosis, and amyloid degeneration of the kidney. Continuation of the infiltration processes causes obstruction of the veins and arteries of the pelvis and edema of the vulva and the lower extremities. Hemorrhoidal veins become greatly distended and cause profuse bleeding. The resistance of the peritoneum to the encroachment of the disease is very marked. Its approach to the peritoneum is followed by reactive inflammation and extensive adhesions, so that cancerous nodules rarely reach the peritoneal cavity. Sepsis is also rare. When septic peritonitis is produced, it is caused by rupture, by pyosalpinx, or by penetration of the cavity from the cancerous nest. While sapremic symptoms are frequently associated with cancer, the temperature elevation is not high, for the reason that the disintegrating tissue is usually shut off from the general system by a zone of hard infiltration tissue, which is not very absorptive. When high tem-

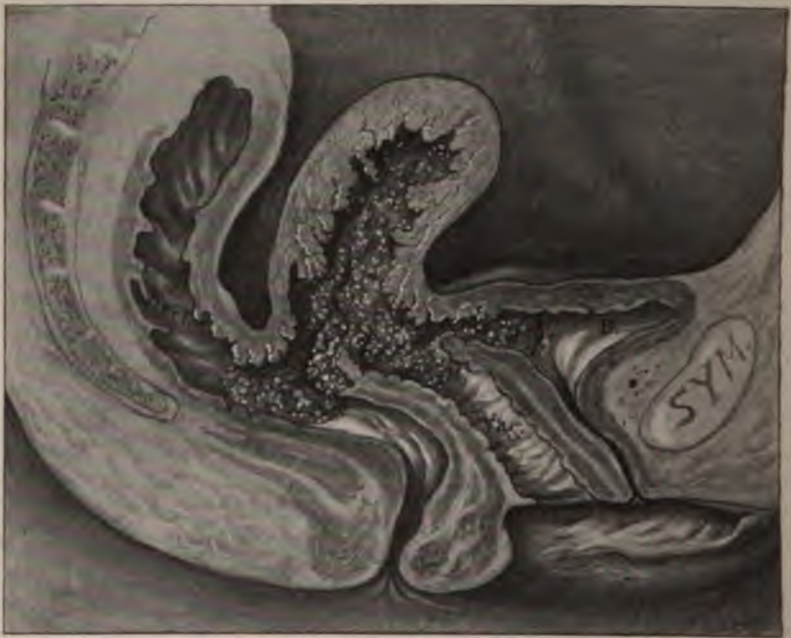

Fig. 481.—Communication between Bladder, Vagina, and Rectum.

perature is present, it is generally due to an extension of the disease to other organs, especially the bladder. It is very important to ascertain the presence of metastasis to other organs. In the ordinary course of the disease it extends to the vagina, bladder, rectum, and vulva; but it may reach the same glands by metastasis, as well as the ovary and retroperitoneal glands. Metastasis may occur into remote organs, as, the liver, lungs, and kidney, although the number of cases in which wide diffusion occurs is comparatively few.

Cancer affects the mature, debilitated, and overworked, but it is also found in the well nourished, and not infrequently in the comparatively young. The disease in the latter is usually much more rapid in its course. Its mere existence is an evidence of lessened resistance to its ravages. In the early stages, with patients in good condition, the general appearance would contraindicate its existence; but with recurring hemorrhage and discharge, emaciation rapidly occurs. Emaciation is more rapid when to the other symptoms is added pain, which robs the patient of her night's rest. To the drain from hemorrhage and to the loss of rest is soon added the depressing effect of the putrid changes, from a collection of organisms which exert a very painful influence upon the general condition. The skin is pale, and gradually becomes a smutty yellow from increased emaciation. The eyes are sunken and the skin is thrown into loose folds or appears to be drawn over the skeleton. The changes of this condition are known as the cachexia. The indications of suffering are stamped upon the countenance so indelibly as to be readily recognized by the experienced. From other conditions causing uterine hemorrhage, as myoma especially, a cancerous patient is recognized by the tanned appearance of the skin and the progressive emaciation. In myoma she may become pale, anemic, and often yellow, but there is no loss of flesh. Indeed, the embonpoint seems increased. In cancer the loss of strength is aggravated through the increased disgust for food occasioned by the foul-smelling atmosphere in which she is forced to live. Gusserow's view is undoubtedly correct, and the intense odor occasions the nausea, and is made manifest by the return of appetite when, by any medical or surgical procedure, the condition of such a patient is temporarily improved. Vomiting mostly occurs later, and is a result of uremia. Rarely, it may be occasioned by invasion of the peritoneum. The loss of strength and flesh is progressive, until finally the patient dies in profound marasmus. Occasionally, she suffers no convulsive attacks from uremia, but just sufficient coma to render her insensible to the discomfort of the condition. In some cases septic or carcinomatous peritonitis, pleurisy, pneumonia, lung embolism, or amyloid degeneration of the large glands leads to a premature end.

560. Diagnosis.—Upon the early recognition of cancer will frequently depend the only hope for radical relief of the disease. Demonstrations of Virchow dismiss the idea of cancer being in origin a constitutional disease and demonstrate its purely local character. A study of the clinical course, however, indicates that while the disease is of local character in the beginning, transmission to the surrounding structures takes place, and the disease practically becomes constitutional. It is important, therefore, that the practitioner should recognize the gravity of the disease at the earliest possible moment. When the condition is one of doubt, the attending physician, in the interest of his patient, should have the doubt resolved by securing the advice of a more experienced man. Only by early recognition and by radical treatment before the extension of nests into the parametrial tissue can we hope to avoid the fatal termination of this disease. It is well recognized that many patients fail to appreciate the gravity of their symptoms and postpone consulting a physician until the favorable period for intervention has passed, but it is equally true that many others are subjected to general or local treatment or are advised to await the change of life until the disease has become hopelessly inoperable. This is frequently brought about through aversion of the patient to the gynecologic examination, but the physician will be wiser in absolutely declining to accept the responsibility of treating a patient who declines to permit him to employ the necessary means to determine her state. Should he yield to her request, she and her friends will subsequently hold him responsible for any untoward results.

The ease with which the diagnosis will be made will depend upon the situation of the disease. Following the division already given of cancer of the vaginal portion of the cervical canal and of the body of the uterus, we are prepared to find different physical signs according to its situation. The association of hemorrhage, foul discharge, and pain should awaken profound suspicion that should be satisfied only by careful examination. The carcinoma of the vaginal portion of the cervix is, as a rule, easy to recognize. It is accessible to the investigating finger, and is readily exposed to vision by the use of the speculum. The most characteristic form is cancroid, a proliferating epithelioma or cauliflower growth, which springs by a narrow base from one or the other lip, but may fill up the vagina. It presents to the finger an irregular, nodular mass, which bleeds upon the slightest touch, is very friable, and is frequently covered by greenish exudate or slough. The mass may vary from a nodule the size of a bean to a growth the size of an orange. The disease may present an excavated cavity with indurated wall and undermined edges. In diseases of the cervical canal the external os may present a crater-like opening or may appear healthy. In the early stage the disease of the cervical canal affords no external or apparent indication of the disease. The infiltration involves only the mucous membrane of the canal.

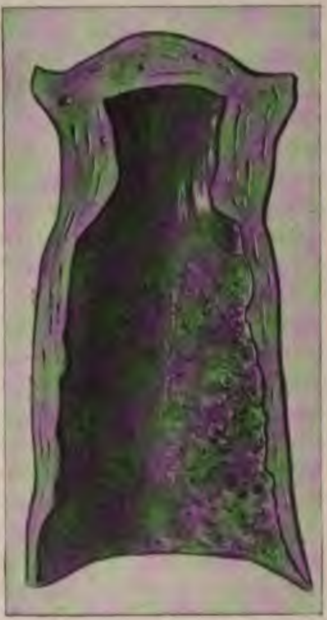

Fig. 482.—Cervical Canal Destroyed by Progress of Disease.

If we follow the rule to secure an accurate examination of such cases, it may be necessary to explore the intra-uterine cavity. This procedure is best accomplished by the use of laminaria tents. These tents should be sterile, and should be removed from a saturated solution of iodoform and ether before introduction. Malignant infiltrated tissue will not readily dilate. The use of the curet shows friable scrapings different from the hypertrophied mucous membrane of endometritis. The introduction of the finger discloses a roughened and indurated canal which is characteristic. In a very early stage the cervical cancer appears as small, indurated nodules, which later become friable. It should be recognized that cancer of the vaginal portion does not manifest a disposition to involve the cervical cavity early, which knowledge enables us to determine that the cervix remains free unless in advanced cases. In doubtful cases the suspected tissue, either in the form of scrapings or an excised piece, should be subjected to microscopic examination. It is objected to the microscopic examination that it takes valuable time to prepare the specimens, but Smyly suggests the two following methods for rapid examination: First, a small piece of firm tissue is selected, dipped in mucilage, placed in a freezing microtome, partly frozen sections of which are cut, transferred to Müller's fluid or to a 2 per cent. solution of potassii bichromas, and, after from a few minutes to an hour, stained and mounted. In the second method a piece of the tissue the size of a bean is placed in twenty times the quantity of methylated spirit or, preferably, in alcohol for a few hours, then a few hours in running water, dipped in mucilage, and sections made after freezing. The sections are removed from water to the slide, where they are stained with either picrocarmin or rubin and orange. These methods are too complicated for the general practitioner.

Spiegelberg has indicated the closer adhesion of the mucous membrane to the underlying tissue, in which no inflammation exists. Our diagnosis should comprise not only the determination of the presence of cancer, but also the extent of involvement and the probability of radical removal. Digital examination by the rectum affords accurate information as to the extent of the disease in the parametrial tissue of the pelvis. Nests or nodules may be found upon the posterior surface of the broad ligament, which cause firm fixation by the extension of the disease in one or both broad ligaments. We should endeavor to distinguish between fixation from previous inflammatory trouble and cancerous infiltration. In the latter the involved surface is more irregular, presents small, hard nodules, and the more distinct limitation, which can be determined through the rectum. The latter examination can be more effectively accomplished with the patient under an anesthetic. A rectal examination should be a matter of routine. Twice I have found coexisting rectal cancer in women who otherwise would have been favorable cases for uterine extirpation. In neither of these patients did there seem to be any connection between the cancerous growth of the rectum and that of the uterus.

The conditions which may possibly be confused with cancer are chronic cervical catarrh with laceration, necrosis of fibroid polypus, syphilitic ulceration, and partial retention of the products of conception. In chronic cervical catarrh with laceration nature makes an effort to repair the injury, the increased weight of the organ and its situation lead to eversion of the lips, and the fissures are occupied by hard, resistant tissue. The exposure of the tender cervical mucous membrane causes inflammatory changes, thickening and eversion, obstruction of the ducts of the glands of Naboth, and the formation of Nabothian cysts. The surface not infrequently is covered with granular tissue, which readily bleeds upon the slightest touch ; the patient consequently has increased bleeding during menstruation, more or less bleeding upon exercise, and bleeding following coition. The indurated surface with a tendency to bleed, the increased leukorrheal discharge, the nodular condition produced by the distended glands, might readily lead an inexperienced physician to believe that he had to deal with cancer. Indeed, many of these cases are so close to the border-line as to render it difficult to arrive at a certain conclusion. The treatment of the case will frequently remove the doubt. Puncture of the cysts and the application of caustics causes cicatrization of the surface, and demonstrates that it is not malignant. It has been said that Nabothian cysts absolutely contraindicate the existence of cancer, but cases have been observed in which Nabothian cysts are filled with their secretion in the immediate vicinity of cancerous degeneration. The absence of friable tissue to the touch, the use of the speculum, and, when necessary, the examination of an excised piece should render the diagnosis of a benign condition positive.

Necrosis of a fibroid polypus is a condition in which the subjective symptoms are very similar to those of cancer. I recently saw a patient, a widow, forty-five years of age, who was suffering from a profuse menorrhagia, from a copious foul-smelling discharge, and had been assured by her physician that she was suffering from an inoperable cancer of the uterus. The appearance of the patient and the odor in the room apparently justified the assertion; but a digital examination revealed a large mass filling up the vagina, which was firm and resistant, and could be turned about from one position to another. The lower surface of the mass was somewhat roughened, but its upper surface was smooth. The finger, carried well over it, could reach a distinct pedicle, which could be traced upward to the uterus; the cervix was thinned, and at no place hard, indurated, or infiltrated; consequently, I had no hesitation in assuring her that she could be relieved.

In necrosis of a fibroid situated within the vagina the diagnosis is readily made. The firmer resistance, the recognition of a pedicle, the absence of any infiltration about the external os, render its character certain. When the growth is situated within the cavity of the uterus, however, it may be more difficult. Here a sloughing fibroid causes hemorrhage and a profuse offensive discharge, but the discharge is usually thinner, watery in character, and may contain particles of the growth. These particles are more in the nature of a slough. The uterus is larger in outline, the cavity of the organ is frequently open so that the finger can enter and come in contact with the mass which fills the uterus, and, by manipulation, occasionally fragments of the tissue may be broken off and examined under a microscope, or often under macroscopic examination the fibrous structure is recognized, which should exclude cancer. Dilatation of the uterus sufficient to permit the introduction of the finger discloses the cavity occupied by a mass which is more or less resistant, not friable, and easily broken down.

Syphilitic Ulceration.—Syphilitic ulceration should be readily distinguished from cancer by recognition of the fact that it does not present an excavated surface with indurated base and edges, that it is associated with evidence of syphilis in other portions of the body, and by the absence of friable tissue upon the ulcerated surface. Microscopic examination to fix the diagnosis is generally unnecessary.

Partial Retention of the Products of Conception.—The retained tissues may be the embryonic envelope, a portion of the placenta, or blood-clots, which, when retained, are subjected to infection, cause an exceedingly foul-smelling and offensive discharge, and their presence is a frequent cause of bleeding. The history of recent abortion or delivery, the dilated os permitting the introduction of the finger, and the recognition of the retained products by exploration determine the condition. The retained products scraped away, a smooth surface is left, which is the normal uterine wall. The absence of further irritation following cleansing of the cavity demonstrates its true character.

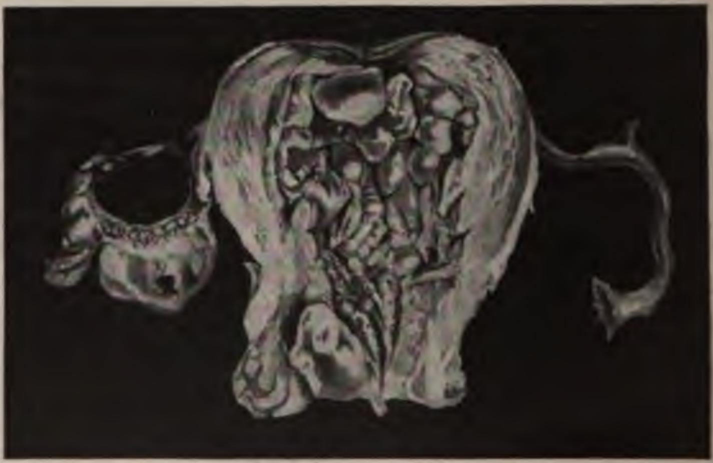

Fig. 483.—Uterus Removed from an Unmarried Woman Twenty-two Years of Age.

561. Duration of Cancer.—The duration of life in this disease is hard to fix, because we know scarcely anything of its first beginning. We have no means of knowing how long a period transpires between its origin and the ulceration which produces the first symptoms for which the patient is induced to consult the physician. The form of cancer is also a determining factor. The soft, medullary cancer is rapid in progress and destructive in its action. The final catastrophe occurs much sooner than in scirrhus. The earlier in life the disease develops, the more rapid, as a rule, will be its progress. The period of survival varies, according to different authors, between six months and two or three years; in epithelial cancer, from three to four years; in medullary cancer, from one to two and a half years. A somewhat longer period is ascribed to cancer of the body. The normal duration of life can be materially altered by therapeutic measures. Cases are seen in which, after operation, months or years passed without any indication of relapse. This is true not only after radical operation, but the patient so improves after the arrest of hemorrhage and discharge by some palliative measure as almost to cause the patient and her friends to doubt the possibility of the disease being of so serious a character.

562. **Prognosis.**—It is only necessary that one should study the clinical course of carcinoma to convince one that the prognosis must be bad. The improvement of the prognosis lies, first, in the early recognition of the disease; second, in prompt resort to radical operation. The first provision requires its recognition even before the characteristic symptoms of the disease are manifest. A patient in whom the irritative conditions favorable to the development of malignant disease exist should be kept under observation, and during the period of greatest susceptibility should be subjected to a quarterly, at least a semi-annual, examination. Causes of special irritation should, as far as possible, be removed by appropriate treatment. Second, radical treatment should be understood as a procedure which will insure removal of the diseased structure within the limits of healthy tissue. Always to accomplish this, the operation must necessarily be early. The probability of rapid invasion of the deeper structure, and of the establishment of secondary nests more or less remote from the original site, is less marked in cancer of the body of the uterus than in that of the cervix or the vaginal portion. Cancer of the uterus in a woman prior to the age of forty years is more malignant in its progress than in women of more mature years. The prognosis of the disease is materially affected by the thoroughness of the operative procedure and by the precautions which are exercised to prevent reinfection of the new wound. Our inability to determine when and to what extent metastasis had occurred renders us unable to fix the prognosis after operation with any degree of certainty in the individual case. An apparently hopeful one will soon relapse, and one for whom the outlook seems uninviting will remain for a long time

relapse free, dependent upon obscure processes whose rationale we do not fully comprehend.

563. Complications.—The more frequent complications of uterine cancer are myoma, ovarian tumor, peri-uterine inflammation, and pregnancy. Myoma usually does, and ovarian tumor may, precede the development of carcinoma. Attention has been recently directed to the association of myoma and carcinoma in the same patient (see Fig. 454), with some effort to indicate the causative relation; but in the great frequency of uterine myoma it would not be surprising should we find, even more frequently than is now recognized, the coexistence of carcinoma. The disease begins in the uterine mucous membrane, and may subsequently extend and infiltrate the growth. The growth can be affected only when there is included in it some glandular structure. It has occurred to me that the irritation induced by the prolonged use of electricity for its influence upon the fibroid growth may favor the development of malignant disease. I have seen carcinoma occur in two cases subsequent to the application of electricity, but the cases under observation have been so few that to make this assertion would be no more correct than to assign myoma as the cause of the cancer. Ovarian tumor may be benign or malignant. Benign growths may become secondarily involved. The cancerous tumor of the ovary, however, varies greatly in its influence and in its manner of progress from the benign.

Peri-uterine Inflammation.—Peri-uterine inflammation may precede or be the consequence of the malignant disease. In the latter condition it is simply a reactive inflammation in which nature endeavors to bar the progress of the malignant disorder. It is important, in investigation of the case, however, to differentiate between the peri-uterine exudation and the cancerous infiltration, as such a diagnosis would influence the operator in his treatment of the cancerous uterus.

Pregnancy is a not infrequent complication of malignant disease. Carcinoma in its earliest stages does not contraindicate the occurrence of pregnancy. The association of uterine cancer with pregnancy and labor presents the gravest danger for two human beings. The frequency of the complication may be determined by the consideration of the following statistics: Von Winckel in 20,000 labors reported 10, and Stratz 7 in less than 18,000; in the Tübingen clinic, in fifteen years, out of 5001 labors there were 7 complicated with carcinoma. One cause of the few cases of association of pregnancy and carcinoma is the fact that the latter exists in the great majority of cases in the later years of life after the period of fertility is more or less nearly passed.

The situation of the disease will have something to do with the possibility of pregnancy. In 89 cases of associated pregnancy and carcinoma the malignant disease was found 38 times in the cervical canal and 47 times in the portio vaginalis. In four cases the site was not determined.

Symptoms and Diagnosis.—The disease presents no symptoms essentially different from those in the uncomplicated cases, and, with the increased congestion of the organ, the disease makes more rapid progress, so the characteristic symptoms—hemorrhage, discharge, and pain—rapidly become aggravated. Hemorrhage is increased, is more or less copious, purulent, and a fresh, watery, sometimes disagreeable, brownish, purulent discharge, which is more abundant and putrid the more marked the destruction of the malignant new formation. The diagnosis is rendered easier by the comparison of the hard, firm, infiltrated, carcinomatous parts with softer edematous healthy tissue in the pregnant condition. By the touch, carcinomatous nodules of the vaginal portion of the cervix may lie before the placental tissue, or even before the child's parts, and should not disturb the physician. In some cases the initial stage may be so slight as to be overlooked, and in doubtful cases microscopic investigation should be employed.

More difficult even than the carcinoma is the recognition of the existence of pregnancy in the first months. Pozzi claims that it is impossible to diagnose the existence of pregnancy with uterine cancer before the fourth month. A number of cases are recorded in which pregnancy was first recognized during or after a total extirpation. It can be readily understood, then, why pregnancy may be overlooked in the second and third months. The earlier recognition of the condition is of extreme value, as observations have demonstrated the fact that the increased congestion which occurs in the uterus favors the more rapid development of malignant disease. It was formerly held that the existence of pregnancy during cancer allayed or arrested its progress, to be redeveloped subsequent to its termination, but careful observation has demonstrated the fallacy of this view; on the contrary, the increased nutrition which is directed to the uterus by the occurrence of pregnancy favors the more rapid development of the malignant trouble. The microscopic investigation of the excised tissue and the simultaneous enlargement of the uterus should cause the complication to be suspected.

It is of interest to study the effect of carcinoma on pregnancy and labor. The disturbances which such complications can induce in the course of pregnancy and labor must necessarily depend upon the situation and extension of carcinomatous disease; sometimes they are only trifling, but occasionally they may mean the death of mother and child. The progressive and severe hemorrhage, the profuse leukorrheal discharge, associated with a complication of pregnancy, result in general anemia, which produces a gradual loss of strength. The existence of the trouble renders the development of cancer much more rapid, and consequently early interference should be considered as indicated. The influence upon the labor, when the pregnancy goes to full term, depends entirely upon the situation of the disease. The accompanying endometritic processes can lead to existence of placenta prævia. When the disease is confined to the vaginal portion of the cervix, it will not be impossible for labor to be spontaneous, but obstructions occur as soon as the portio is circularly seized in its entire circumference; or, if the cervical canal has become strongly infiltrated, the tissue is absolutely unyielding. Unless prompt measures are resorted to, such an individual may suffer from hemorrhage, exhaustion, and fatal termination, with the fetus still *intra partum*.

Among the complications with labor we can have premature rupture of the bladder and weak labor pains. If the pains remain active, the embryo is forced through, and the process results in extensive tearing of the cervix, which may extend to the pericervical connective tissue, cause the most extensive bruising and crushing of the birth canal, and the cervix may even be torn away above the infiltrated ring. Equally significant is the influence of pregnancy and labor upon the cancer. As has been mentioned, it was considered that the existence of pregnancy had a beneficial influence on the progress of the cancer growth. Von Siebold is reported to have observed the spontaneous recovery of genital cancer through a simultaneous pregnancy. The experience of recent years combats this idea. The rapidity of the growth depends upon the character of the disease, being much more rapid in the soft and medullary form than in the scirrhous variety. The labor can cause the most extensive destruction of the parts, and, not only this, but infection of the tissue, resulting in thrombosis, sepsis, and pyemia.

The prognosis of the pregnancy depends upon the kind and the course of labor and upon the general condition of the patient; above all, upon the extension of the cancer. The more difficult the labor, the poorer the general condition, and the more progressive the disease, the more certain will be the unfortunate result and probable death. Cancer of the pregnant uterus is far worse than for the nonpregnant, because pregnancy and labor bring about extremely dangerous results. The rapid progress of the disease during pregnancy, the severe trauma during labor, and the rapid carcinomatous degeneration of the tissue affect the result.

Chantreuil reports that, in 60 pregnant carcinomatous diseased women, 25 died during or shortly after the childbirth; Cohnstein, in 126, saw 72 die; Hermann had 180, of which number 72 died. Uterine rupture alone had 6 victims out of Chantreuil's 60 cases; 11 out of Hermann's 180. Nineteen out of 126 women, according to Cohnstein, died undelivered—about 8.1 per cent. of all the cases. Under the uniform methods of treatment introduced of late years the mortality is somewhat decreased. We consider that the treatment of the complications of pregnancy must be consigned to the operative procedure, either gynecologic or obstetric. Formerly, it was limited to purely obstetric means, such as the use of artificial abortion and premature labor, but it required but little experience to demonstrate that these measures were ineffective. The effort, then, was to maintain the individual as long as possible, with a view to reaching a period of viability for the child, and the obstetric operation became the important consideration. Later consideration of the methods of treatment has led to the following conclusions: In those cases in which the cancer has reached a stage in which radical operation is impracticable, every effort should be made to prolong the pregnancy until the viability of the child. In a patient, however, in whom the disease is in its early stages, and could be removed with hope of a successful result, the ovum should not for a moment be permitted to prejudice the chances for the mother, and radical operation should be undertaken without reference to the child.

564. Treatment.—Our previous study of the anatomic structure and progress of development indicates that cancer originally consists of a primary nest, from which invasion of the surrounding structures occurs. The rational treatment, then, consists in the removal of the diseased structure within healthy limits. Upon the extent of involvement will depend our ability to remove completely the disease, and hence the division into two classes—*operable* and *inoperable*. The following scheme represents the methods of treatment which may be adapted to each class:

- (*A*) *Operable.*
  - 1. Partial extirpation, ... Vaginal.
  - 2. Total extirpation, ...
    - (*a*) Vaginal.
    - (*b*) Abdominal.
    - (*c*) Sacral.
  - 3. Palliative operations, ...
    - (*a*) Cureting.
    - (*b*) Caustics.
    - (*c*) Cautery.
- (*B*) *Inoperable.*
  - 4. Injections, ...
    - (*a*) Hypodermic.
    - (*b*) Cleansing.
  - 5. Anodynes.

565. (*A*) **Operable.—**(1) **Partial Vaginal Operations.—**As carcinoma uteri largely preponderates in the neck, it is quite conceivable that the early operations were directed to the extirpation of that section of the organ involved. Von Grafenberg, as early as 1600, reported that the uterus had been normally extirpated in a number of cases, but it is most probable that the majority of these were amputations of the cervix, particularly as the subsequent continuance of menstruation is noted in several women, and, indeed, the birth of children. In the early cases hemorrhage was controlled by styptics, and many of the patients succumbed to hemorrhage and sepsis.

Partial extirpation has remained, until the last fifteen years, the principal, if not the exclusive, method of combating the disease. It consisted in the removal of the diseased parts with knife or scissors, and the control of hemorrhage with the cautery or strong fluid caustic. The difficulty in controlling hemorrhage led to the employment of the chain or wire écraseur, by which the diseased tissue is crushed off. A marked improvement was the employment of the galvanocautery loop—the galvanic loops placed upon the cervix above the margin of the disease, tightened, and the cervix amputated. This procedure has been extensively practised by C. Braun and Byrne, with extraordinary results. The latter has made the procedure still more effective by substituting the galvanic knife for the loop.

Neither the employment of the écraseur nor the use of the loop can be considered as an ideal surgical procedure, for, with the first, injury of the neighboring organs can not always be avoided, and, with the second, it is not always possible so to place the loop that amputation of the vaginal portion of the cervix results with certainty in healthy tissue. A more progressive method, by returning to the amputation with the knife and supporting the wound surfaces by sutures, was introduced. The procedure was introduced by Hegar, who made a funnel-shaped incision. Schroeder perfected the supravaginal amputation of the cervix, a method capable of meeting all the requirements of the present partial uterine extirpation per vaginam.

Amputation of the Cervix with the Galvanocautery Loop.—The preparation for vaginal operation (Section 119) is made, exercising care to penetrate and disinfect the neck. The cervix is exposed with specula or retractors, seized with a hook forceps which dip into the healthy tissue, and drawn upon, while the platinum loop is placed as high as possible, coming immediately under the transverse folds which indicate the position of the bladder, and is tightened so that it cuts into the tissue. The vagina is now protected from the heat by wooden plates and is syringed several times with water as the excision progresses, in order thus to cool and preserve from burning. The wire should be kept at a red heat, so that the surfaces may be well scorched. The wire should be slowly tightened and the cervix cut through. When slowly accomplished, there is no subsequent tendency to bleeding. The higher the wire is placed, the more probable it is that Douglas' space will be opened. Such an accident, however, requires no further consideration than to pack the cavity with iodoform gauze. By the employment of the galvanocautery knife Byrne improved the operation. He cut around the vagina, separated it from the cervix, and was enabled to remove the latter at a higher level.

Hegar's Operation.—The funnel-shaped amputation of the cervix described by Hegar is accomplished as follows: The cervix is fixed by double tenacula and drawn downward. A knife is introduced as far away from the limits of the disease as safety for the bladder and ureters will permit, and is carried about the cervix, held at such an angle as to cut out a cone-shaped mass, the apex of which would be high in the cervical canal. The hemorrhage is controlled by sutures and tamponade. Baker operated in a similar manner, but controlled the hemorrhage with the cautery, while Van de Warker cauterized the surface with zinc chlorid.

Schroeder's operation is a supravaginal amputation, of which the following is a description: The cancerous portion is exposed by Simon's retractors. With a sharp curet all removable tissue is scraped away from the new formation until the curet reaches firm tissue, when the entire bleeding surface is scorched with a hot iron, the vagina being protected from the heat and frequently irrigated as the operation proceeds. The cervix is seized with a vulsellum and drawn downward as far as possible. An incision—if possible, one centimeter from the disease margin—is carried about the cervix; with the index-finger or a gauze pledget the bladder is bluntly separated from the anterior uterine wall. The bladder and ureters are thus shoved upward, when the anterior wall of the neck can be removed at a high level. In this operation Douglas' space is frequently opened, but the cervix is retained in connection with the lateral parametrium. The cervix is pulled to one side while with a Deschamp needle a ligature is passed as far away from the cervix as possible, tied firmly, and the tissue cut between the neck and the ligature. If the tissue is thick, a number of ligatures may be applied, one above another, and when the opposite side is likewise treated, the cervix is cut away. When necessary, all the cervix below the internal os can be removed. If Douglas' pouch is opened, the circumstance may be made useful in closing the parametrium, as the needle can be passed upon the finger, introduced through the opening. The cervix is then amputated at the level of the internal os. The section is made through the anterior vaginal wall to the cavity, and, before proceeding further, the anterior vaginal wall is stitched to the anterior cervical wall by from two to four sutures. The amputation is completed by cutting through the posterior wall, when the surfaces are sutured as in the anterior. A number of sutures are now applied to the lateral portions of the wound to insure closure. The sutures should be carefully placed in the lateral angles in order to secure the uterine arteries. When they are ineffectually secured, hemorrhage may be free and threaten a fatal result. The patient can arise in from ten to twelve days and be discharged after from eighteen to twenty days.

The high amputation of the cervix has had many advocates, who champion it in preference to extirpation as being safer and less prone to subsequent relapse. The employment of the galvanocautery knife may produce a beneficial influence in the destruction of cancer nests which would be overlooked by the scalpel. An objection to the operation is that the cervical opening may contract and become closed, causing subsequent distress, and necessitate further operative procedure to relieve the dysmenorrhea or hematometra. Cases of pregnancy have been reported, but the difficulty in labor was so great, because of the scar tissue, that operative delivery was required and the patients died. Similar experience has been observed in the Hegar operation, owing to the difficulty in introducing the sutures. All these disadvantages are avoided by the Schroeder operation.

The investigations of Seelig have demonstrated that infection was carried through the lymphatics to the cervix, and even to the body, of the uterus. Such an occurrence would render anything less than extirpation of the entire organ of no service, and we have no means of determining when it has taken place. An additional reason for preferring the entire extirpation is that the cicatricial tissue is always irritable, and is a source of danger in a woman predisposed to undergo malignant change. The removal of the uterus and ovaries brings about a lessened congestion of the pelvic tissues, and will certainly leave the patient free of subsequent periodic engorgement of the pelvic structures. The cases suitable for the partial operation are infrequent.

566. **Total Extirpation of the Uterus.**—Isolated examples of total extirpation of the uterus have been mentioned as having occurred at various times during the eighteenth century, but it remained for Freund, by the abdomen, and Czerny, by the

vagina, to formulate procedures which have led to the more complete and satisfactory methods of the present day.

Total extirpation may be undertaken in one of two stages of development: first, when no evidence of involvement of the parametrium exists, when the object is to eradicate the disease by ablation of the organ and of surrounding portions of vagina and parametrium, or to operate within healthy tissue; second, when there is some involvement of the parametrium, with fixation of the uterus. The latter operation is not curative, but may ameliorate symptoms.

In performing the radical operation two purposes should be kept in mind: first, to operate in healthy tissue and to keep beyond the confines of the disease; second, to protect the patient from any possibility of reinfection.

First, the recognition of the processes of development and extension of cancer makes it absolutely uncertain in any individual case that we have accomplished this purpose. We have no means of knowing how early metastatic extension may have resulted in the involvement of the parametrium beyond the safe limits of operation. In some cases this may occur early, in others late, so that in a case of slight involvement we are inclined to promise a cure, and are horrified to find in a very brief period a return, while in another the entire vaginal cervix may be destroyed, rendering it difficult to get well beyond the disease without injury to the bladder or ureters, and the operation is performed only for palliative purposes, but the patient remains free of relapse for years, or even permanently.

Second, the possibility of reinfection or of the transplantation of portions of cancerous structure upon a healthy wound and its reproduction of the disease is questioned. Such a view would seem a reasonable explanation for the redevelopment of cancer in a wound where macroscopic investigation indicated that we were well beyond the confines of the disease, but the opponent of infection justly instances the possibility of metastatic nests in the parametrium, discoverable only by the microscope, from which the relapse has occurred.

Such statements for the vicinity of the wound are difficult to combat, but if, in a single case, the disease can be transplanted to the abdominal wound in abdominal hysterectomy, it should be considered proof that such reinfection may occur, for the region would be entirely out of the usual route for metastatic extension. Such an infection came under my observation in the practice of one of my colleagues, in a young unmarried, but not childless, woman. Within two months of an abdominal hysterectomy nodular masses were observed in the abdominal wound, which subsequently progressed.

Whether we accept or reject the theory of infection, the precautions taken to prevent it are only such as will be of service in rendering the parts sterile and in preventing infection from pathogenic germs, which every one will admit are present.

Preliminary Treatment.—In every extirpation of the organ, whether by the vagina or the abdomen, in addition to the prepa-

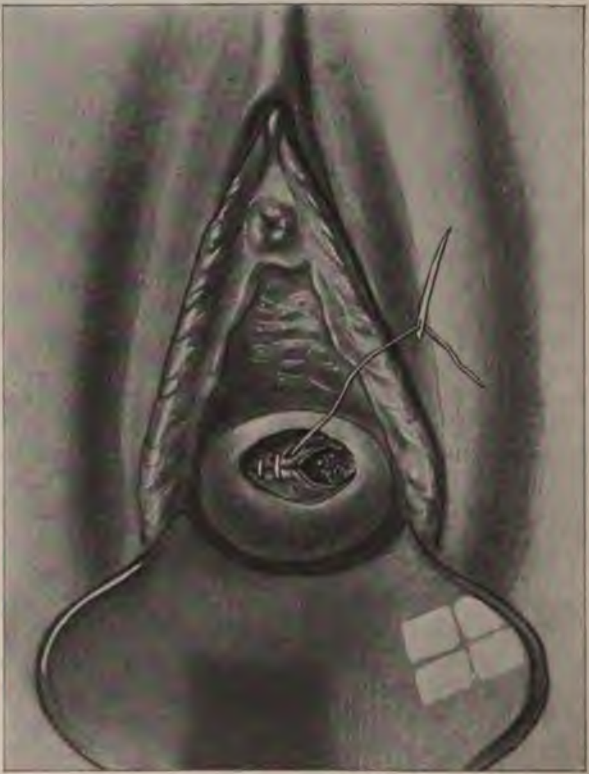

Fig. 484.—Formation of Flap to Cover Diseased Surface Preliminary to Operation.

ration indicated in Section 119, precautions should be practised to remove the diseased and disintegrated tissue. The surface should be gone over with a sharp curet, all loose and ragged edges trimmed with scissors, and the entire surface thoroughly scorched with the thermocautery. Sutures should then be placed to close up the diseased surface. If the entire vaginal cervix is more or less involved, incisions should be made upon each side that will permit flaps to be turned down and sutured over the diseased tissue. The vagina should be continuously irrigated during the process of closing off the diseased surface and carefully sponged with a solution of sublimate in alcohol (1 : 500).

567. Vaginal Hysterectomy.—Many isolated cases of extirpation of the uterus per vaginam are found in the literature of the last century, notably those of Langenbeck and Sauter-Recamier. Czerny, on August 12, 1873, revived the operation. The operation has been variously modified. The following method is a very acceptable plan of procedure: The uterus, after preliminary preparation, is seized by a double tenaculum or a silk loop and drawn down as near the vulvar orifice as possible, and an incision made about the cervix through the vaginal wall with scissors or knife. Anteriorly, the incision is carried as far away from the disease margin as safety for the bladder will permit. It can be carried further back posteriorly without fear of injuring the rectum. This incision is by many preferably made with the thermocautery knife, which has the advantage that it decreases hemorrhage and makes an additional slough, preventing early union and better favoring drainage. Any bleeding vessels should be seized by clamp forceps. The bladder is dissected from the cervix with the finger by blunt dissection until the peritoneum is reached. The vagina is pushed off laterally and posteriorly in a similar manner. A ligature on each side of the cervix is so placed as to include the uterine arteries, and, when tied, the ligament is cut between the ligature and cervix. The peritoneum is now opened in front, and the fundus is drawn through the anterior fornix. A ligature is then placed upon the upper part of the left broad ligament and the latter is severed, setting the uterus free upon one side. The other broad ligament is secured in a similar manner, the ligament severed, and, finally, the posterior peritoneal fold. This procedure avoids contact of the peritoneal cavity with the stump during the entire operation.

When the disease is extensive, more parametrial tissue may be removed by tilting the uterus to the opposite side and carefully snipping the tissue, seizing any spurting vessels with clamp forceps, and applying individual ligatures; the uterine artery can usually be recognized by the touch, isolated, and tied. All sutures should be of catgut, as silk is likely to become infected and produce a discharge and maintain a sinus until it comes away, which may require months, unless previously removed. Such a patient will be in constant apprehension that the disease is returning. The disposition of the ovaries and tubes will depend upon their situation and the extent of the disease. If they are easily displaced downward, they should be removed; if high up, requiring considerable manipulation to displace them, they should be permitted to remain, as they cause no trouble. With the completion of the operation the wound should be carefully inspected for any bleeding vessels, as it is not impossible that a ligature may slip from the stump and a fatal hemorrhage result. Any bleeding points should be picked up and secured with separate ligature.

The treatment of the wound will depend on the condition of the patient. Thus, if the patient is very much debilitated and it is undesirable to keep her long under the influence of an anesthetic, the wound may be packed between the stumps with iodoform gauze, carrying the latter sufficiently high to prevent the intestine from coming in contact with the raw surfaces. The gauze packing is lightly placed in the vagina and the vulva covered with a pad. In relaxed vagina, or when the condition of the patient will permit of more time for the operation, the ends of the broad ligaments are preferably united and the stumps drawn well into the vagina; the sides of the vagina are united to each stump by a deeply passed suture, which, when tied, holds up the vagina and avoids its subsequent relaxation for want of support. The vagina is closed, with the exception of a small opening in the center, through which a gauze wick should be passed. This packing, when the blood control has been complete, may be permitted to remain for from four days to a week. Upon its removal the cavity is irrigated with a 1:2000 formalin solution, and may be lightly repacked, although the packing should not be carried so high as the first portion. The anterior and posterior walls of the vagina are thus permitted to fall together and become adherent. If there is no tendency to displacement of the viscera downward and the belly of the patient is not distended, the gauze need not be replaced, but we subsequently content ourselves with irrigation. The patient should be confined to bed for two weeks; frequently cases are permitted to rise earlier than this, but the long rest in bed is no disadvantage. The pelvic floor is firmer, and is less likely to be split and subsequently to prolapse.

Various modifications of the operation have been suggested. Three years after Czerny introduced it, Sanger was able to collect thirteen different methods of operating, and with each year subsequent various modifications have been suggested. Mikulicz was the first to use the curet. Billroth and Olshausen added scorching the surface with the thermocautery; others, in addition, cauterized with carbolic acid or chlorid of zinc, or used iodoform, liquor ferri chloridi, alcoholic bromin solution, and absolute alcohol. Tauffer made his preliminary preparations several days before the operation, and Leopold advocated disinfection as the first step. Schauta began the operation with the thermocautery. Bottini, Wecchi, and Calderini amputated with the galvanocautery loop, and followed with extirpation. When cancer is situated high in the cavity of the uterus, antiseptic syringing is practised, the cavity packed with iodoform gauze, and the os closed over it with sutures or with clamp forceps. In order to limit the discharge of secretion in carcinoma of the body, Schauta introduced a tupelo tent into the cervix. This tent was somewhat constricted in the middle from perforation, and a thread was introduced, the ends of which were armed with needles. These needles perforated the cervical canal anteriorly and posteriorly, and the ends of the suture were tied over the end of the tent. The swelling of the tent acted as a plug to the cervical canal. Mackenrodt introduced the formation of flaps from the anterior and posterior vaginal surfaces, which we have described. Landau, in making the incision, advocated that it should be ovoid, the posterior surfaces somewhat higher than the front. Such an incision gave greater accessibility to the operation field. Doyen lengthens the circular incision by one right and left, in order to create a still larger opening, and especially to be able to separate about the bladder and the ureters more securely. Fritsch incised both sides of the vagina; the base of the broad ligament is cut and tied, so that in this manner the uterus is easily movable and readily drawn down before the cervix is separated from the anterior and posterior union. Schatz opens into Douglas' space; then the uterus is completely freed from its lateral union, and, finally, the bladder is separated from the cervix. The ureters have been injured in this method of operating. Billroth separates by degrees the broad ligament, ligates the individual vessels, and fastens the broad ligament in a properly prepared clamp forceps. Schroeder drew the uterus through the opening of Douglas' space into the vagina. This procedure is not always performed with ease. Fritsch rotated the uterus through the anterior peritoneal opening. Olshausen operated with the uterus continually *in situ*, and endeavored to separate it first on that side which showed the least invasion by cancer. Corradi and P. Müller rendered removal of the uterus easier by dividing it into two portions by a sagittal section, and then removing each half singly. This procedure, without question, renders the removal of the uterus more easy, but if we believe in the reinfection of the wound, it greatly increases the danger. The ligation of the broad ligaments has also given great variety of procedure. Some ligate small sections; others ligate in mass. Olshausen, in the beginning, attempted to surround the broad ligament with a single ligature, but the sloughing stump would slip out from the ligature and considerable hemorrhage result. Liebmann attempted to ligate the parametrium in such a manner that the ligature is knotted on the vaginal mucous membrane in order to limit its slipping. The superior part of the broad ligament, with the spermatic vessels, repeatedly slips from the ligature and requires supplementary ligation, which is accomplished with great difficulty. Veit fastens the superior part of the stump with hook forceps and ties behind them on the ligament.

With regard to the removal of the ovaries there has been considerable discussion. Czerny, in his first case, removed the appendages supplementary to the removal of the uterus. Schroeder, Olshausen, and others leave them when no indication of disease is found. Von Teuffel and Kaltenbach urge their removal; the latter emphasized the possibility of infection of the peritoneum by leaving inflammatory diseased portions of the tube. The retention of the appendages in carcinoma of the uterine neck is not found to favor the appearance of relapse. The course of the lymph-channels arising from the cervix has no relation to the appendages of the uterus. They should always be removed whenever pathologic alterations are recognizable. After Reich, in several cases of carcinoma of the body, had demonstrated cancerous disease of the ovary, the removal of the appendages was advocated in all cases, in this form of uterine cancer. In the former operation it was the habit to use irrigation with strong antiseptic solutions very freely. To-day the majority of gynecologists, after the radical disinfection of the field of operation, proceed with sterilized instruments, without irrigation, employing antiseptic irrigation only in necessary cases to purify the field of operation.

The vaginal operation will be especially difficult if the canal is narrow and rigid or the uterus very large. Under such circumstances the majority of operators have incised the vaginal wall or the paravaginal tissue, by which procedure the lumen of the vagina is considerably increased. Von Winckel, in one case with enormous narrowing of the vagina and a large uterus, split the entire rectum and rectovaginal septum up to the vaginal vault. The large vaginorectal wound was sutured with silk, and recovered by primary intention. Duhrssen made a deep vaginal incision, which penetrated from the vaginal vault and completely opened the ischiorectal cavity and the entire vagina. Section on the right side penetrated the vagina, and also the rectum, to the depth of six or seven centimeters. By this incision not only the vaginal tube, but also the surrounding muscular structure, the levator ani, and the constrictor cunei are separated. The direction of the incision is in the middle line, between the tuber ischii and the anal opening. By such an incision the entire field of the operation is incidentally increased, and the resistance of the soft parts of the pelvic cavity is removed. The hemorrhage from the vagino-intestinal incision is either controlled by ligature or through pressure of retractors. After the removal of the uterus the wound is closed by sutures. After such an incision relapses have occurred in the scar tissue, which are evidently infection relapses. Schuchardt creates a still larger accessibility to the field of operation by opening more widely the ischiorectal cavity. He makes two accessory incisions. One splits the entire lateral vaginal wall, from below to the neck ; on the other side a long vaginal incision from behind progresses to the sacrum, and encircles the rectum bow-like, in an incidental sagittal section. The long incision is made upon the side in which the parametrium is strongly involved, and extends to the outside of the convex bow at the side of the anus. The extirpation of the uterus in these operations differs from the usual vaginal extirpation only in that the parametrium has been opened up so that some cancerous nodules can be removed therefrom without exposure of the ureters. The vagina is closed from above downward by knotted suture.

While it is without question that these extensive vaginal incisions afford greater freedom in our manipulation of the uterus, the ease with which the uterus can be reached from above would seem to contraindicate such a method of procedure, but much more by the increased danger of reinfection of the parametric tissue that must be associated with it. In order to be able to remove larger portions of the parametrium with safety Pawlik, Kelly, and Clark introduced catheters in the ureters to render their position more definitely determined and to permit with safety the removal of larger portions of the endometrium. Mackenrodt, in total extirpation, cuts about the vagina some distance from the portio and prepares anterior and posterior flaps, which are drawn over the portio and sutured so that the diseased tissue is completely covered. He splits the anterior vaginal vault by a median incision from the urethral swelling to the circular incision. The accessibility of the operation field is still further increased by a deep vagino-intestinal incision. The bladder is dissected from the cervix, and especially from the broad ligaments, and therewith the ureters are separated some distance ; and, finally, the uterus, with as large a portion as possible of the parametrium, is extirpated. The peritoneal wound is closed after the contraction of the stump, the vagino-intestinal incision narrowed by suture, and the vagina, with the supravaginal wound, packed with iodoform gauze. Later, Mackenrodt performed an operation in which the extirpation of the uterus and of the greater part of the vagina was accomplished with the hot iron. He believes that a larger extent of the vagina must be removed than is customary, because we do not know that a latent contact infection of the vagina does not already exist. He performs the operation as follows:

With cutting instruments, Paquelin cautery, or galvanocautery the entire vagina, or at least the upper half of it, is separated; a vaginorectal incision is made which extends to the portio and lays open the operation field; then the vagina is seized with forceps and separated downward by hot iron. If the upper part of the vagina only is removed, we begin with a circular incision in the middle of the vagina. After extirpation of the vagina the portio is secured with forceps and Douglas' cavity is opened with a hot iron. The bladder and the broad ligaments are separated from the cervix by a properly constructed shovel forceps, drawn as far as possible to the outside, and separated by the cautery. After the separation of the base of the broad ligament of both sides spurting vessels are seized with Koeberle forceps, which are placed in the higher part of the broad ligament, separated by the cautery, and the stump scorched. The now very movable uterus is easily inverted. The upper parts of the broad ligaments are fastened with Richelot's clamps and a ligature is placed on each side, after which the separation of the stump results. After the removal of the uterus the rectovaginal incision is closed by sutures, when, in spite of the scorching, primary union is usually obtained. The perineum is not sutured. The burned cavity is filled with iodoform gauze. Elevation of temperature follows. Of ten cases subjected to this operation, two suffered from sepsis.

Byrne has removed the entire uterus by the galvanocautery, but used the knife instead of the loop. Winter and Frommel combat the possibility of the danger of contact infection of the vagina being great enough to justify such a procedure. Czerny, Frank, and others have pursued the method suggested by Langenbeck of separation of the uterus from its peritoneal envelope, and the several resulting tears in the peritoneal covering were united by sutures. This operation is sometimes very easily done, but in others is extremely difficult. Richelot and Péan advocate the use of clamps instead of the ligature. The preliminary steps of the operation are performed similarly to those already described. After opening the peritoneum in front and behind the uterus, the organ is held by the broad ligaments, through which enter the uterine and ovarian arteries. Clamp forceps are applied at each side of the cervix, upon about one-half of the broad ligament, and the structure is cut between the cervix and the clamp. The uterus is drawn down, if preferred, and the fundus is brought forward and through the anterior fornix; clamp forceps are applied from above upon the remaining portion of the broad ligament. The section between the clamp and the uterus frees that organ, which can be removed. The clamps are then held apart, the surfaces are separated by retractors, and careful inspection is made to determine that all bleeding vessels are controlled. Any spurting vessels should be secured with smaller clamp forceps or the arteries should be ligated. The clamps are held apart and iodoform gauze is carried into the vaginal canal between them to the point at which the peritoneum has been separated, and is loosely packed between the clamps. The gauze should be carried over the end of the clamps, so that the coils of intestine shall not impinge against them and become injured. The operation has the advantage that it can be performed very expeditiously, and requires much less time than the application of the ligature. It has the disadvantage that the tissue within the grasp of the clamp undergoes sloughing, causes a foul discharge, an offensive odor, and sloughing tissue which endangers the infection of the peritoneal cavity. The convalescence of such patients is usually attended with considerable elevation of temperature.

Tuffier reports twenty-seven cases of vaginal hysterectomy without the use of forceps or ligatures. The uterus was bisected, one-half drawn out of the vulva, the finger passed behind the upper part of the broad ligament, and the included tissue grasped between the blades of a powerful clamp, called the angiotribe, which is tightly screwed. The tissues are thus crushed and the artery is occluded. After the crushing of the tissues the ligament is cut through and the upper part of the broad ligament crushed in a similar manner. It is very important that the handle should be secured as tight as possible and the blades kept in the axis of the vagina. In none of the cases reported had any accident occurred during the operation, and absence of hemorrhage was particularly noted. This procedure is also advocated quite strongly by Dr. Newman, of Chicago. Dr. Eastman places the patient in the Sims position, stretches the anus to allow greater readiness of access to the pelvic cavity, retracts the perineum with a Sims speculum, and makes an incision about the uterus, which opens Douglas' culdesac posteriorly and between the bladder and uterus anteriorly. He then passes a curved staff over the broad ligament, by which a ligature is carried, and the broad ligament secured in mass; then over it is passed a pair of interlocking forceps, by which the broad ligament is firmly constricted. The broad ligament is severed, after which it may be ligated in sections, or the clamp permitted to remain. The other broad ligament is treated in a similar manner. The advantage he claims for this procedure is greater security in the control of hemorrhage, and the vagina is held at a higher level and its prolapse prevented. The position of the patient, with preliminary dilatation of the anus, gives greater freedom of access to the uterus.

568. Accidents of Vaginal Total Extirpation.—The most frequent injury is that of the bladder, which can take place in various ways. Thus, it may occur in the blunt separation from the anterior cervical wall. The danger of this becomes the greater, the more closely the new formation has approached the bladder. If it has passed over on to the external layer of the bladder-wall, we may very readily puncture the bladder in the most careful separation. When the bladder is infiltrated, the preferable plan is to cut out the diseased tissue and close the opening by sutures. Injury of the bladder is recognized, however, most frequently for the first time at a longer or shorter period after the operation, when a part of the urine is lost through the vagina. Either a small bladder injury has been overlooked, or, what is probably more frequent, the bladder has not been sufficiently separated from the ligament, and in placing the ligatures upon the parametrium a portion of it is fastened in the ligature, so that a slough of the affected bladder-wall occurs. A spontaneous closure not infrequently results from the scar retraction. When it has not closed, the repair of the fistula must be undertaken by operation. Kaltenbach claims that injury of the urinary apparatus occurs in about 10 per cent. of all cases; this, for the last few years, should be too high. An *injury of one or both ureters* is occasionally observed. The injury can be avoided if the bladder and ureters are well pushed back. It does not require the previously mentioned sounding of the ureters to avoid ureteric injuries. One should exclude cases from operation in which the parametrium and the surroundings of the ureter are infiltrated with carcinoma. In such cases the shoving back of the ureter is exceedingly difficult, and not infrequently is associated with injury. The most serious injury of the ureter consists in the application of a ligature upon it. Ligation of both ureters is, without question, fatal, and the ligation of one manifests considerable injury. Schatz does not believe the ligation of one ureter necessarily unfavorable, as the other kidney performs increased duty. He also believes that in one case after ligation of the ureter the canal again became penetrable a few days later. A number of operators have had to remove the corresponding kidney as a result of the ligation of the ureter. Zweifel, in double-sided ureteric ligation forty-eight hours after the operation, loosened the ligatures on the one side, and the strongly swollen ureter was made accessible again to the bladder; but as urine retention continued six days after the operation, the ligature on the other side was removed and the restoration of the ureters attained.

Injuries of the rectum are much less likely to occur. They result only from especially unfavorable relations, as in adhesions of the rectum to the uterus. Frommel reports a case in which, in an attempt to open Douglas' space, the adherent rectum was injured, and, in spite of the most carefully introduced sutures, he lost the patient from septic peritonitis. In rare cases communication between an intestinal loop and the vagina, with involuntary fecal discharge, has occurred, most generally from relapse in the operation scar, by which the carcinoma extends upon an adherent loop of intestine. Numbers of cases are reported in which ileus results from adhesions in the open peritoneal wound. In symptoms of ileus the intestinal loop should be separated from the vagina after opening the wound. If this fails, an artificial anus should be made or the affected loop of intestine should be resected.

569. Abdominal Hysterectomy.—The first systematic operation for the removal of a uterus for malignant disease through an abdominal incision was performed by W. A. Freund, on the 30th of January, 1878. The operation has undergone a number of modifications since its introduction by Freund. After proper preliminary preparation (Sections 110 to 120) incision is made in the median line from three centimeters above the symphysis to a short distance below the umbilicus. The patient is placed in the Trendelenburg posture and the intestines are pushed toward the diaphragm and walled off by gauze. The uterus is seized by a double tenaculum or a vulsellum, or is controlled by the passage of a suture from the fundus. It is drawn into the wound and a ligature is applied external to the ovary and tube of the one side, and in a similar manner upon the other, this ligature securing the upper part of the broad ligament and including the round ligament. The ligature tied, the broad ligament is cut between it and the uterus. Any bleeding from the uterine end is controlled by the application of clamp forceps. An incision for a peritoneal flap is made just above the insertion of the bladder, and the flap is pushed down, which separates the bladder from the anterior surface of the uterus and broad ligaments. The left index-finger, passed between the lower section of the broad ligament and the bladder, easily recognizes the position of the uterine artery by its pulsation, and a ligature is passed beneath it which secures the broad ligament. When both ligaments are thus secured, the remaining portion of the fundus uteri is drawn well over the pubes, while an incision is made into the posterior vaginal fornix, and is extended around the cervix, completely separating it from the vagina. The precaution is exercised not to injure the bladder or the ureters. With the removal of the uterus, the cavity is carefully cleansed and examined for bleeding vessels, which are secured and ligated. The vaginal opening can be packed from above with iodoform gauze, an end of which is carried into the vagina, while the portion above covers the injured surfaces and prevents the contact of intestines. This gauze should be permitted to remain from four to six days, until the peritoneal surfaces have been closed over the vagina, and have made it an extraperitoneal surface. Some surgeons prefer to suture the peritoneal flaps, and loosely to pack the wound from the vagina with iodoform gauze.

In Freund's first procedure the broad ligaments were ligated above, as we have described, a second ligature was placed on the portion of the broad ligament which included the round ligament, and a third secured the base of the broad ligament by being introduced from the vagina through a trocar needle which Freund devised for the purpose. The last ligature is tied upon the base of the ligament as firmly as possible. In this way we have three ligatures, one under another. Each broad ligament was secured in the same manner. The peritoneum above the bladder fundus was cut transversely upon the anterior uterine wall. A similar section was made upon the posterior wall, somewhat lower, and these wound margins were united with a silk loop after the removal of the uterus. The uterus was separated by knife or scissors. Hemorrhage from small vaginal arteries was controlled by ligation. All the ligatures were carried into the vagina, and by traction the stump was drawn down. This dragging made the peritoneum of the bladder approach that of the posterior wall of the pouch of Douglas. These two walls could be united by continuous catgut suture. A most careful toilet of the peritoneum was accomplished, the eventrated intestines were returned, and the belly wound was closed with sutures. The sutures that were pushed into the vagina could be removed by traction at the end of three weeks. The greatest danger of the operation was infection of the peritoneal cavity.

This operation has undergone various modifications. Credé proposed to resect a part of the anterior pelvic wall several days before the operation, but found no imitators. A. Martin made a moon-shaped abdominal incision from the one anterior superior spine to the other, by which he hoped to be better able to keep the intestines in the abdominal cavity. He has not continued the procedure. The separation of the bladder from the uterus prior to the introduction of the base sutures has been a great improvement, decreasing the danger of injury of the bladder and of ligation of the ureters. Simpson, of New York, was the first to isolate and tie the uterine artery. Kuhn raised the uterus by means of the colpeurynter in the vagina, and made it more accessible. Eastman accomplished the same thing by a grooved staff through the posterior vaginal fornix. Bardenhauer advocates leaving open the peritoneal wound for drainage, but his results were not such as to make the plan acceptable.

Modifications of the operation are to make through the vagina first an incision around the cervix; pack the cavity with iodoform gauze and complete the operation from above. Another is: separate the front and back, open into the vagina, and complete the operation by the application of clamps to the broad ligament. Veit operated by ligating and cutting the broad ligaments as far as the vault of the vagina; then he completes the operation through the vagina. Mackenrodt advocated the removal of the greater part of the ligament, as he believed that the danger of relapse was caused by infection carried into metastatic nests in the parametric tissue; and the more thoroughly and completely that tissue could be removed, the better were the chances of the patient. Gubarroff, of Moscow, advocates the abdominal procedure, because of the impossibility of the removal of lymph-glands and the tissue at the base of the broad ligament in vaginal total extirpation.

In marked involvement of the cervix Rumpf proceeded by the following plan: He ligated the broad ligament above, opened up the parametrial connective tissue, and proceeded to see each ureter in its entire course from psoas to the bladder; thereby the uterine arteries were severed and ligated, and the parametrial tissue could be removed bluntly nearly to the uterus without incidental bleeding. Subsequently, the anterior leaflet of the broad ligament was cut through, the peritoneum over the surface of the bladder divided transversely, and the latter bluntly separated from the cervix. The parametrial tissue beneath the ureter could be still further removed. The vagina was separated by means of a Paquelin cautery, after the removal of the uterus, was filled with iodoform gauze, and the peritoneum was closed over the rest of the broad ligament. Rumpf reports a case operated upon in this manner which remained free from relapse for over two years. This same procedure has been followed by Clark and Kelly, who introduced fine bougies into the ureters to render them perceptible.

Ries advocated the removal of the lymphatic glands, as being the source from which the redevelopment occurred. He operates in the following manner: cuts out the portio from the vagina, tampons with iodoform gauze, incises the belly from the symphysis to the navel, ligates the separation of the infundibulopelvic ligament toward the pelvic wall, splits the peritoneum over the common iliac, lays the vessel free, partly bluntly, partly by cutting until its bifurcation is reached, when the ureter is set free, separated as far as the bladder, while the broad ligament is tied toward the pelvis by degrees and the part toward the uterus is secured with clamps. The bladder is separated bluntly from the surrounding broad ligament and the uterine artery is tied, possibly peripherally. The collected fat tissue, with the glands, is removed from between the large vessels—the external and internal iliac. The vagina is opened, the uterus removed, and the vaginal canal filled with iodoform gauze, while the peritoneal flaps are united with a continuous silk suture and the belly cavity is completely closed. When infection was so great as to require so extensive a separation, the danger from sepsis and from relapse of the disease was so great as to render the operation of doubtful value. Werder, of Pittsburg, appreciating the danger of wound reinfection, has advocated abdominal hysterectomy, ligation of the broad ligaments, the vagina to be pushed off with the uterus from one-third to one-half its length, when, by a previously introduced suture or hook forceps, the uterus is drawn through the vaginal outlet, and the remaining portion of the operation is completed by the vulva, which saves the wound from any contact with the infected portion.

In order to control hemorrhage in an extensive dissection of the pelvic structures, Polk advocated ligation of the anterior trunk of the internal iliac artery. The distribution of vessels from these trunks is, however, somewhat irregular, the vessel itself is short, and the structures supplied by the posterior trunk are so bountifully nourished by anastomotic vessels that in two cases I tied the internal iliac vessels, which permitted a most extensive dissection free from bleeding. In both these cases the involvement of structures was so extensive that the operation was of doubtful utility. The first patient survived the operation and returned home, but soon perished from a relapse; the second case developed tetanus at the end of ten days after the operation, from which she died.

Schroeder, after ligation of the infundibulopelvic ligaments and the portion of the broad ligaments containing the uterine arteries, amputated the fundus at about the level of the internal os. After bleeding vessels had been secured and the stump dissected out, the vaginal surfaces were united, over which the peritoneal flaps were sutured. The operation is objectionable because of the danger of reinfection.

570. Comparative Advantages of the Two Proceedings.—The principal danger of the abdominal procedure arises from septic infection. The investigations of Menge and others have demonstrated the presence of pyogenic germs in the discharges of uterine cancer. The much longer duration of the operation, the increased exposure to infection, and the lessened powers of resistance favor its development. In the vaginal procedure the peritoneum is less exposed to infection, and the operation can proceed without any, or with scarcely any, soiling of the peritoneal cavity. In our present methods of procedure the operation is more expeditious; with the separation of the bladder from the cervix of the broad ligament, the uterine artery can be ligated without danger to the ureter.

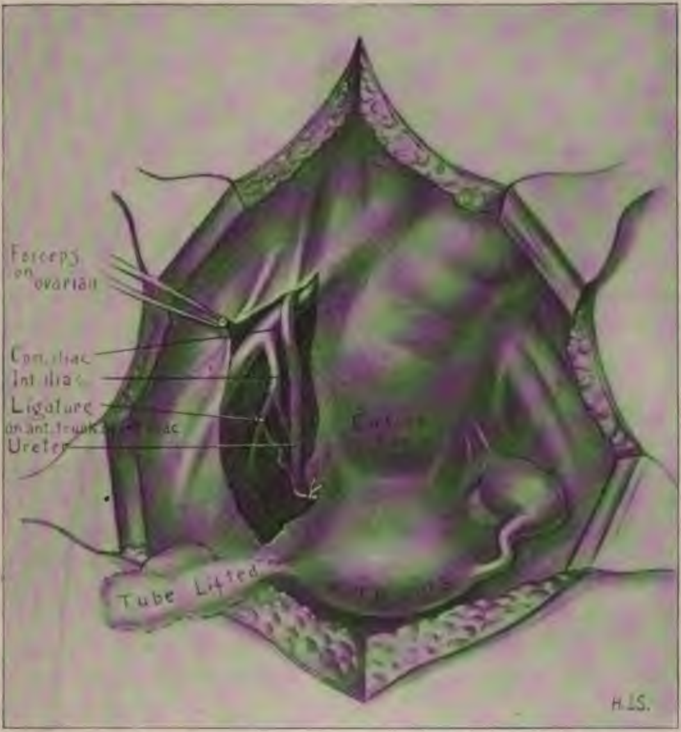

Fig. 485.—Ligation of the Anterior Trunks of the Internal Iliac.

The Freund operation presents greater oversight of the operative field than is afforded by any other method.

The claim for the abdominal procedure, that it permits the extirpation of the lymphatic glands, is of but little significance when we remember that the glands are rarely involved until very late in the disease; and when the disease has extended to the lymphatic glands of the pelvis, the operation is but little better than a mutilation, for it will scarcely have any influence upon its subsequent progress.

The vaginal operation should be given the preference in all cases of large, roomy vagina, when the uterus is movable and not too large to permit its being brought through the vagina without reduction in size.

A narrow, contracted vagina, a large or fixed uterus, extensive involvement and destruction of the cervical walls, which afford no firm tissue to be seized, and more or less fixation of the uterus from inflammatory lesions, all should indicate resort to the abdominal procedure. Complications of the diseased uterus with abdominal growths, such as myoma, ovarian tumors, and extra-uterine pregnancy, should be attacked by the abdomen. The line of demarcation in the choice of procedure will largely depend upon the predilections of the operator; thus, Freund would prefer the abdominal to the exclusion of the vaginal route. When we come to the duration of after-results, the advantage seems to favor the abdominal procedure. From this standpoint it would seem wise to confine the vaginal procedure to cases in which the cancerous disease is limited to the uterus, and to resort to the abdominal if there is any indication of the possible invasion of parametrial tissue the largest portion of which can be removed by abdominal section.

Injuries of the ureters occur less frequently by the abdominal route, but the operator in all cases of extensive involvement of the parametrium should ascertain the position of the ureter by following it down from above before blindly applying a ligature. Through neglect of this precaution I have twice ligated a ureter. If the ureter is unavoidably or accidentally injured, an attempt may be made to unite it by suture, as was done by von Tauffer and Westermark, or the ureter may be implanted in the bladder.

In a case of extensive parametrial involvement in a young woman an extensive infiltrate was found surrounding the ureter, even extending into its wall. The ureter was dilated to the size of the index-finger. To leave the mass would render the operation completely unavailing, so I cut off the ureter, removed the infiltrated mass and end of the ureter, and transplanted its upper end into the bladder at a higher level. The patient recovered, and some six months later succumbed to a relapse. Kustner, when unable to accomplish a transplantation, forms a vesicovaginal fistula; then performs a colpocleisis in preference to a nephrectomy.

571. The Sacral Method.—Kraske, in 1885, introduced an operative procedure, under the title of the sacral method, for the purpose of extirpating the upper part of the rectum for carcinoma.

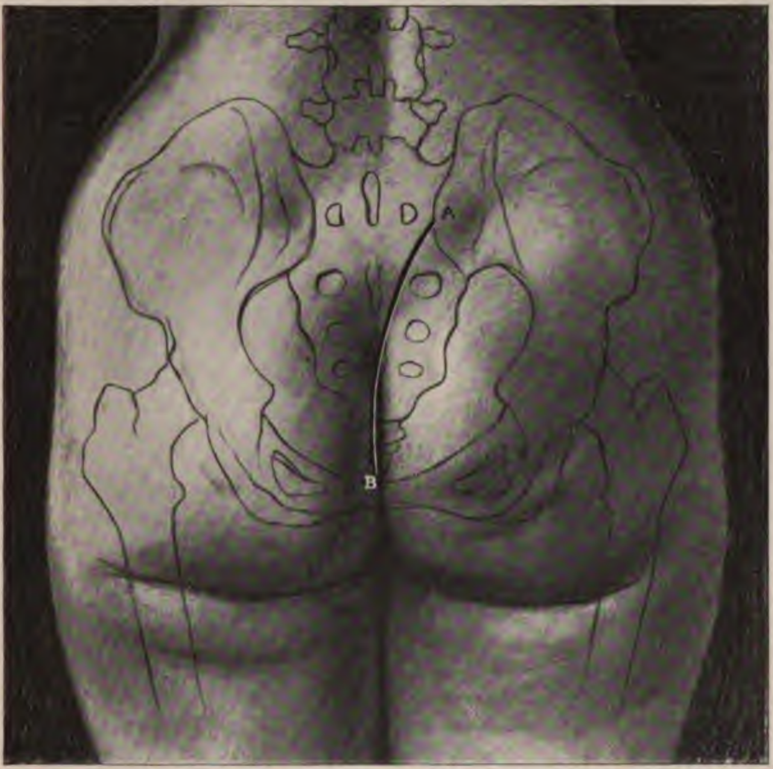

Fig. 486.—Skin Incision for Sacral Resection.

It consisted in reaching the rectum after the removal of the coccyx and the resection of a portion of the sacrum. Hochenegg, in 1888, after a series of brilliant successes, adapted the operation to the treatment of some of the disorders of the female sexual organs, and the following year reported the application of the method to the removal of the uterus. The operation was performed as follows: The patient placed in the Sims position, with the pelvis slightly elevated, an incision was made from two to three centimeters above the left sacro-iliac synchondrosis to within one centimeter of the left side of the anus. After cutting through the skin and fascia, the under part of the sacrum and the entire coccyx were exposed. Now follows the bone operation. If the coccyx is large and broad, its removal is sufficient; otherwise, a portion of the left sacral wing is also resected. If a part of the sacrum is to be removed, we cut through the sacrosciatic ligaments, and with a rongeur cut away the left side of the lower two segments of the sacrum. The prevertebral fascia is split the entire length of the wound; the now free-lying rectum is bluntly separated on the left side and displaced to the right. Later experience demonstrated the advisability of opening upon that side of the rectum on which the parametrium was most infiltrated.

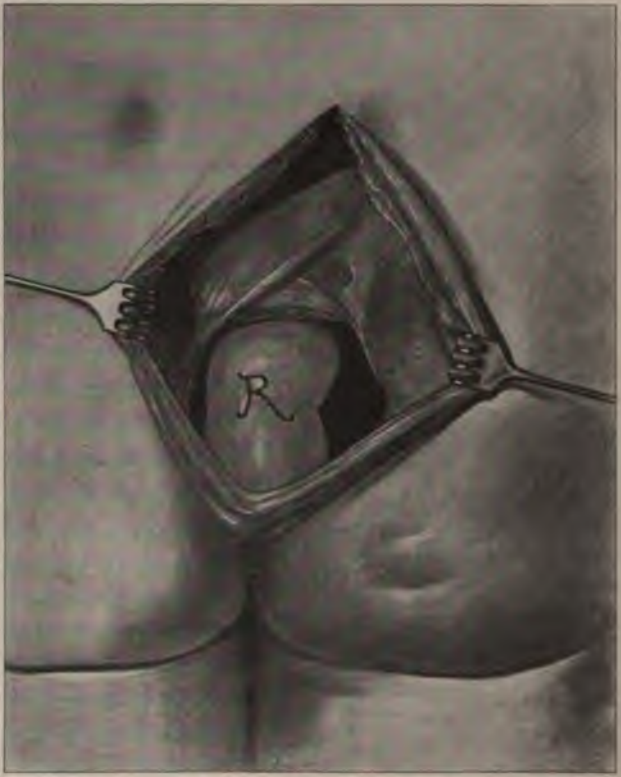

Fig. 487.—Sacrum Resected; Rectum Exposed.

The rectum is shoved aside and Douglas' space opened by a transverse incision, which is recognized as the hardest part of the operation. One or two fingers are introduced into the opening, the uterus and its appendages are explored, and the practicability of their removal is determined.

In removal of the uterus it is seized and drawn through the incision of Douglas' space into a position of strong retroflexion.

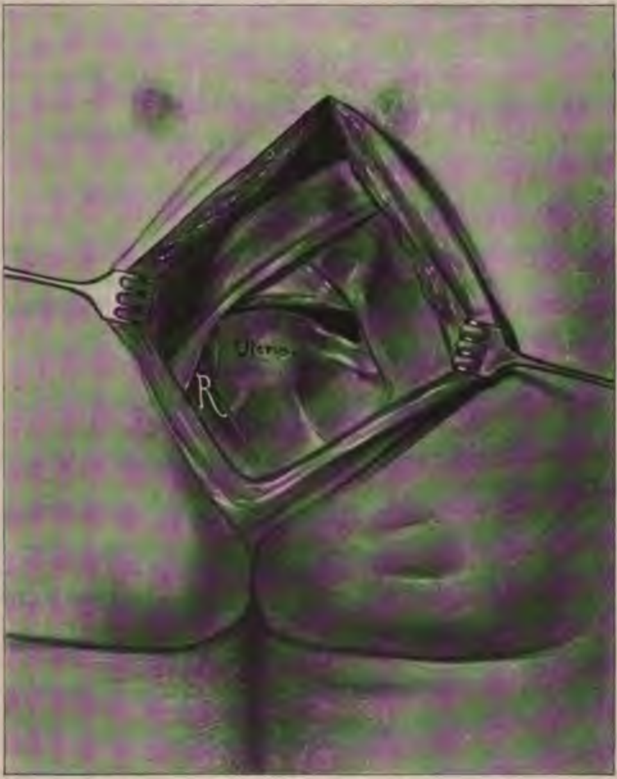

Fig. 488.—Rectum Pushed Aside; Uterus Exposed.

The broad ligaments upon both sides are cut between double ligatures; when the uterus becomes so movable that it can be further drawn down, its anterior surface is inspected. The peritoneum above the vesico-uterine reflection is cut transversely, and, together with the bladder, pushed downward. The uterine arteries are generally ligated under the eye, and the ureters easily pushed aside, although they have been injured. After the separation of the lateral appendages the organ remains in union only with the vagina. A transverse incision through the peritoneum in front of the uterus is made, which is separated and sewed to the peritoneum of the anterior wall of the rectum. The vagina is closed in two stages. Iodoform gauze is packed about the remaining portion of the wound and brought out at the center of the posterior wound, both ends of which have been closed. This operation was extended by Herzfeld, who found that, in the majority of cases, only the removal of the coccyx was required. He penetrated the right side of the rectum, for the reason that the vagina is situated more to the right, is more accessible, and there is less interference with the rectum. The transverse opening is made in Douglas' space, the right and left broad ligaments are tied and cut, after which follows a complete closure of the peritoneum before further extirpation. There is no possibility of soiling the peritoneal cavity by contact with cancer. The rectal peritoneal surface is sewed to that of the bladder and the stumps are fastened in the wound laterally, making them extraperitoneal. Hegar cut transversely in the anterior uterine wall above the bladder fundus, and shoved back the bladder and ureters. The remaining removal of the uterus is similar to that described in Hochenegg's and Herzfeld's operation. Schede protests earnestly against sacrificing the sacrum. In a large series of operations he never found it necessary to remove enough of the sacrum to involve the lower sacral foramen and its nerve. He designates the removal of the lower two sacral nerves a crime, as the destruction of these nerves paralyzes the detrusor vesica uterini and causes a very severe inflammation of the bladder, which increases the distress and peril of the patient. Zuckerkandl introduced a still more conservative method, in which there was no bone resection. Skin section was from the left side of the tuberosity of the ilium until midway between the end of the coccyx and the anus. At the sacral margin it formed a bow bent hard to the right. The gluteus maximus muscle, the sacro-iliac and sacrosciatic ligaments, the musculus coccygeus, and part of the levator ani muscle were cut through at the margin of the sacrum and coccyx. The rectum is set free, and the operation proceeded with as previously described.

Wolffler places the skin section to the right of the sacrum, over the somewhat narrowed part at the union of the coccyx and sacrum; the section forms an easy curve, with its concavity to the right, and ends near the rectum, in the neighborhood of the vulvar commissure. The gluteus maximus and the levator ani are cut near the rectum, and the deeper structures become accessible. Zuckerkandl designated his and Wolffler's methods as parasacral section. These operations are more bloody, because the sacral, the median, and the inferior hemorrhoidal arteries, and the pudendal artery and vein are in the range of the incision. Hegar made an osteoplastic resection of the sacrum and coccyx. A V-like incision, with the arms beginning one centimeter beneath each inferior posterior iliac spine, converged to the point of the coccyx. After separation of the soft parts and bands near the sacral margin the rectum was bluntly separated from the anterior sacral surface, a chain-saw was introduced between the third and fourth sacral openings, the sacrum cut transversely through to the posterior periosteum, which was retained, and the sacral part turned up. After the operation, this flap was returned to place and secured by sutures. Consolidation usually took place in a very short time. In two cases necrosis resulted, and the flap had to be removed. After the operation the skin wound was closed, with the exception of a small drainage opening, and the advantage of the procedure is that the anatomic relations are exhibited as before. This osteoplastic resection of the sacrum is applicable to the removal of carcinomatous uteri as well as retro-uterine tumors.

Kocher and Heinecke recommend the splitting of the sacrum in the middle and the separation of the sides from one another. Levy and Schlange, in opposition to Hegar, turned the flap toward the anus, while Rydygier made the incision in the soft parts on one side, and, after transverse incision, turned the sacrum toward the other side. Borelius changed this method in the removal of a carcinomatous uterus as follows: He began with the skin section in the middle line, some two centimeters above the sacrococcygeal articulation; then, somewhat to the left, approached the point of the coccyx forward, through the rectosciatic fossa, three to four centimeters from the anal aperture; from this point he progressed forward, and again approached the middle line until led to the posterior commissure. After laying free the left border of the coccyx, the sacrococcygeal angle is cut through. The skin section, in its entire length, is sufficiently deepened, and the coccyx, together with the anal portion, is held to the right; after separation of the rectum we can proceed from the posterior vaginal wall to the extirpation of the sexual organs. After the operation the coccyx is replaced and fixed with periosteal sutures.

Various modifications of Hochenegg's procedure for the extirpation of the uterus have been introduced; by proceeding, as Herzfeld suggested, to the right of the rectum, Douglas' space will not be missed. In the search for the space—made incidentally easy by having an assistant introduce the finger into the rectum to indicate the plica transversalis recti, as the cup of the rectum, and in two cases with resection of the rectum. All these cases recovered. In one of the latter the operation consisted in the removal of five inches of the rectum, the uterus, ovaries, and tubes, the posterior wall of the vagina, and the perineum. The rectum was stitched to the skin over the sacrum and to the anterior wall of the vagina. This operation was performed for epithelioma involving the rectum, extending to the perineal margin around the anus and in the parametrial tissue behind the uterus. The patient had previously undergone a Widal colotomy. After the recovery of the posterior wound an incision was made around the artificial anus and the two ends of the bowel were raised and reunited, after which all fecal discharges took place through the sacral anus. Thirteen months after the

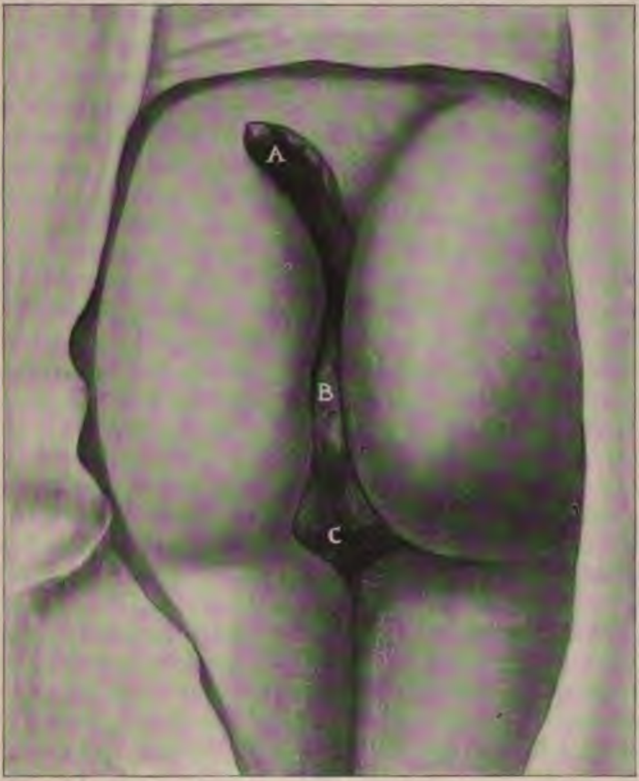

Fig. 489.—Patient from Whom Uterus, Ovaries, Posterior Wall of Vagina, Perineum, and Five Inches of the Rectum Have Been Removed.

operation the patient returned to her home in Ireland, since which time no knowledge has been obtained of her progress.

572. **The Perineal Method.**—Zuckerkandl, in the year 1889, presented a method for extirpation of the uterus by an opening between the vagina and rectum. With the patient in the lithotomy position, the intestine was raised toward the sacrum with a /‾‾‾\ -shaped flap incision, whose nearly seven centimeters long transverse portion lies in the half oval line in front of the rectum, and whose angles upon each side extend to the ischial tuberosities. After separation of the skin and superficial fascia, and separation of the skin flaps from the under layer, the projecting bundle of the external sphincter, which penetrates the labial commissure, is separated and the lower part of the vagina loosened from the rectum. The remaining part of the septum is bluntly dissected until Douglas' fold is reached, when the vagina is opened transversely, the uterus drawn out from behind, and its extirpation occurs as readily as in the sacral method. The peritoneum is closed, and, after removal of the uterus, the ligament stumps can be buried in the peritoneal cavity or placed by sutures extraperitoneally, as in the vaginal method. Frommel seems to be the only one who has found this operation practicable. He holds it advantageous to cut about the vagina, as in the vaginal method, push back the bladder, pack the vagina with iodoform gauze, and then make the perineal operation. The operation is quite bloody, as the numerous venous plexuses between the vagina and rectum are opened. The operation seems an unnecessary interference with the pelvic floor, as the same increased room will be secured by enlarging the vagina and the danger from infection must necessarily be very greatly increased.

573. **Mortality of the Vaginal Operation.**—The mortality of the vaginal operation has been very greatly decreased with improved operative methods and more careful technic. We need but to compare Czerny's operations in 1882, 32 per cent. mortality, with those of Wisselinck's collection in 1897, of 740 cases, with 8 per cent. mortality. Under especial operations the success to which the work can be carried is evidenced by the reports of Olshausen and Fehling, the former of whom had but one death in a hundred cases, and the latter two. The successes of the operator will depend somewhat upon the class of cases in which he operates. If he is inclined to operate in desperate cases, the mortality will necessarily be increased. The number of cases coming under observation early, and favorable for operation, is quite small. This is evidenced in the Berlin clinic: with 402 carcinoma cases, only 83 were favorable for operation.

574. **Duration of Recovery.**—In the earlier operative work

it was considered that if the patient survived the operation two or three years free of relapse she might be considered as cured, but further experience has demonstrated that relapse may occur up to the fifth year. After this time the probability of the duration of the recovery is very great. There are occasional cases in which relapse after partial operations has been discovered as late as six, seven, or eight years. It would be a question in these cases, however, whether it might not be considered a condition similar to that which would take place in a woman whose susceptibility to malignant degeneration was great, and that the irritation produced in scar tissue would favor such development and should be considered the primary, rather than the secondary, condition. Frommel, in his investigations, has never seen relapse occur after four years. In 188 cases of cancer of the neck and 26 cases of cancer of the body reported by Fritsch he saw 65 free of relapse at the end of one year, or 58.5 per cent. of the cases in the neck and 69.2 per cent. of those in the body. At the end of two years Olshausen saw 141, or 44.7 per cent., of the neck, and 16, or 81.2 per cent., of the body free from relapse; at the end of three years he reported 112, or 37.5 per cent., of the neck, and 13, or 69.2 per cent., of the body. At the end of four years he found free from relapse of cancer of the neck 88, or 29.5 per cent.; of the body, 11, or 63.6 per cent. From this collection it is rendered evident that in the first and second years after operation the great majority of relapses appear, and then more and more the number falls off.

The final results of individual operators, however, are so very different that it is impossible in general to draw valuable conclusions from them. Thus, Kaltenbach, with his brilliant primary operative results, evidently extends the indications for the operation quite far, and subjects all cases to it in which it seems technically possible. It is quite readily understood that in such a number of cases there must be a few in whom the new formation has advanced proportionately far, and that relapse is not surprising. Leopold, on the other hand, drew the indications very narrowly. The investigation of statistics demonstrates that the vaginal operation has given excellent primary results, but, on the other hand, it shows that, of all the radical operations to which patients are submitted, after a year one-half have relapsed, and that in the second year a still considerable percentage relapses. The gravity of the disease can be still further appreciated when we realize that only a small percentage of the cases which come under the observation of the gynecologist are in a condition to permit of radical operation.

575. **The Occurrence of Relapse.**—Those cases subjected to

radical operation when the parametrium is without doubt extensively infiltrated are not only immediately followed by cancer relapse, but a fatal termination is very rapid. Tannen has proved that the duration of life in such relapse of diseased tissues is briefer than would be the case if the disease were let alone, and that the duration of life for eight and nine months in patients who thus relapse is less than can be secured by palliative treatment, such as partial resection or energetic cauterization of the carcinoma. Sanger and Thorn have shown that by the latter the duration of life is lengthened. Surgeons, from their experience in mammary cancer, are inclined to combat these views, but statistics do not support them. As contraindications, then, against vaginal total extirpation are to be considered strong enlargement of the uterus and extended adhesions, especially with intestine Those uteri should be excluded from vaginal operation which can not be removed except through the vagina without morcellation. To this class belong those carcinoma which are complicated with myoma. Pregnant and puerperal uteri are proportionately easy to remove by the vagina, in spite of their enlargement, as has been demonstrated by Olshausen, Hofmeier, and others, and the comparative narrowing of the vagina observed in the nullipara and in old women exhibits no contraindications to the vaginal operation.

The primary operations are so satisfactory that we could scarcely wish them otherwise. Olshausen's one hundred total extirpations with but one death, when some patients were already pyemic, are positively brilliant results. Winter describes three forms of relapse: first, local or wound relapse—a return of the cancer, in its primary kind, in the compass of the field of operation; second, lymph-gland relapse—a return of the tumor in any lymph-gland of the body; third, metastatic relapse in the course of the blood-vessels creates a return of the tumor in the internal organs, as it results from portions of carcinomatous growth that have been overlooked in the operation. These correspond more or less to the neighborhood of the previous operation, which demonstrates the correctness of Thiersch's view, confirmed by Heidenhain's investigation on mammary cancer, that the carcinoma frequently extended itself far over the lateral or immediate limits in small sprigs, and that, after the removal of the new formation, the mass is seen to be separated by healthy tissue from visible sprigs or microscopic cancer nests that may be the source from which the cancer redevelops.

Our study of the progress of the disease has already illustrated the extension of carcinoma of the vaginal cervix in the vault and parametrial connective tissue. Mackenrodt and Leopold, in their anatomic investigations of extirpated parts of the parametrium, have demonstrated fine, microscopically perceptible sprigs situated in remote parts of the parametrium, and it is quite possible that such fine sprigs may be found outside of the incision as well. It is, consequently, difficult to be certain whether wound relapse occurs from sprigs of cancer growth in the parametrium or from small masses which have been broken off from the diseased tissue and been implanted upon the new wound. Most generally the patient gains in body-weight and improves in appearance after the operation, but individual cases will be found to exhibit pain in the depth of the pelvis at an early period, which radiates from the lower extremities, and frequently becomes very distressing. In its further course there is edematous swelling of the lower extremities, not rarely venous thrombosis; in other cases, bleeding and discharge, which cause the patients to return for investigation.

The diagnosis of carcinoma relapse is mostly fixed without difficulty if we make a combined investigation from the rectum, with the thumb in the vagina, by which the penetrated parametrium can be fixed between the finger-tips. Hemorrhage may sometimes take place in granulations which are formed about the ligatures, especially if silk has been used. When the appendages were not removed, we may have a soft feeling, with bleeding from the vagina, which is, upon an exact examination, recognized as the fimbriated end of the tube. The absence of infiltration and the impossibility of separating the small tumor masses from a polypus of the vagina contraindicate carcinoma. In doubtful cases the tissues should be examined with the microscope. Another form of relapse is that of which Winter speaks as infection-relapse, in which portions of carcinoma are broken off, come in contact with healthy tissue, there lodge, and develop the original disease. In a single woman upon whom I operated, removing a small uterus through the vagina, the operation was attended with considerable difficulty; the fundus uteri was torn open in attempting to bring it down, and some jelly-like material escaped into the peritoneal cávity, which was thoroughly irrigated as soon as the operation was completed. Less than six months later the patient developed a mass upon the side of the pelvis corresponding to that into which this fluid material had escaped, and, upon opening the mass, material similar to that which had escaped from the uterine cavity was found, and the disease progressed until the death of the patient.

The second form of relapse is a lymphatic gland relapse. The investigations of Poirier and Leopold have demonstrated that the lymphatic vessels of the middle and upper thirds of the vagina and from the cervix proceeded to the iliac glands along the arterial vessels which are distributed in the neighborhood of the linea innominata, and before the sacro-iliac articulation in the angle formed by the separation of the external and internal iliac vessels. The lymphatic vessels of the uterine body proceed to the upper margin of the broad ligament and follow the spermatic artery to the vertebral column, where they open into the lower lumbar lymphatic glands, which are situated behind the peritoneum in the neighborhood of the large vessels. Fortunately, lymph infection occurs late in cancer of the uterus, so that lymphatic gland relapse after total extirpation is a rare condition. After chloroform narcosis the roundish, hard, immovable nodules can be recognized in the pelvis.

The third form is that of metastatic relapse, in which the disease is carried to more or less distant organs and presents nodules of a histologic structure similar to that of the primary cancer. These metastases in uterine carcinoma are rare, and exist only in advanced stages.

576. (*B*) **Inoperable.**—This class comprises the great majority of the cases which come under the observation of the physician. Extirpation of the uterus becomes an impossibility because of the extension of the disease, and as palliative and symptomatic therapeutic measures are obligatory, this section is an important one in treatment. The treatment of this large division has not received the consideration given to the operable class, but its value must not be considered trifling. We have to study the means which will afford the patient temporary relief, diminish her suffering, and occasion, at times, a hope of recovery. The great variety of methods employed betokens the weakness of our efforts to oppose the ravages of the fearful disease.

The principal indication for treatment in inoperable carcinoma of the uterus is to combat the symptoms, as hemorrhage, discharge, and pain. The hemorrhage indicates that the new formation of the disease projects into the capillaries and small vessels, the walls of which are formed by the cancer cells, so that the most trifling injury or increased blood pressure results in rupture. The later suppuration results from wandering-in of saprophytes, which causes the secretion to break down. The collection of secretion and blood in the vagina affords ready entrance to those germs which result in suppuration. They may invade the surface of the less well-nourished new formation. Hemorrhage and discharge are not always marked symptoms. The disease often makes great progress without these severe symptoms being present. They may exist only as a severe seropurulent discharge similar to that which occurs in senile colpitis, while the odor can be almost completely absent. In old women we frequently observe hard, scirrhous forms of cervix cancer, which show but trifling inclination to disintegrate; consequently, discharge and hemorrhage are wanting, and pain is caused by the further progress of the new formation or is exhibited as the only complaint of the patient. In such cases we employ narcotics almost exclusively.

Cases which require an aggressive treatment are those forms of portio and cervix cancer especially which are characterized by strong growth of the new formation. The more rapid this growth, the more rapid is its transition, and, therefore, the earlier hemorrhage and discharge appear. A most effective method of treating such a condition is the removal of the newly formed mass. In the more gradual development of the disease it progresses deeply; its superficial parts slowly perish, often with considerable hemorrhage, loss of fluid as offensive discharge, decreased appetite, and therewith weariness. Palliative operative treatment is especially suitable for the cauliflower form of growth in the portio, unless the vaginal walls have been invaded. All cancerous cavities of the cervix can be produced from the infiltrated portio or cervix carcinoma, which is more determined in advanced cases. Results are less promising when, with existing ulceration, is associated very severe infiltration of the pelvic connective tissue surrounding the cervix. Further, when the new formation has already invaded the vagina, the knife should not be employed to do more than cut away the fungiform growth, because the wall is thin and the infiltration zone is often difficult to recognize. The knife is especially improper in the more deeply situated cancer of the cervix, for which the sharp curet should find most employment. The operation should be preceded by a careful examination under narcosis, which is often necessary to determine contraindications to total extirpation.

A palliative treatment may be employed in order to spare the patient further narcosis. In investigation we especially observe whether the new formation projects deeply into Douglas' cavity or upon the bladder. In such cases injury to organs occurs easily, although injury of the rectum rarely follows. Approach of the disease to the bladder is best investigated by the introduction of a catheter, by which the bladder is pressed against the palpating finger. The extension to Douglas' pouch is easily recognized by a digital investigation from the rectum. In large carcinomatous collections we strive to ascertain the extension of the cancer ends beyond the uterus. If the parametrium is invaded, we must prepare for severe hemorrhage, as cureting can easily injure the large branches of the uterine artery.

Cureting is the principal palliative operation for cancer, but the treatment should not be confined alone to the use of the curet. Such treatment injures previously uninvolved tissue, which becomes a favorable soil for the extension of the disease, and the subsequent progress is more rapid. Cureting should always be followed by an immediate employment of the cautery or by the application of some strong caustic agent which will destroy a large part of the infiltrated zone and reach tissue of a more normal character. The uterus is exposed by a speculum and lateral retractors. In preparation for the employment of the cautery the operator should be prepared to protect the vagina and external genitalia with wooden retractors. To avoid too much absorption of light from the depth of the cavity by their dark color, their inner surfaces should be coated with a thin layer of quicksilver. In addition are needed sharp curets, scissors, forceps, needle-holder and needles, the latter for use in case of fistula, though they are seldom required. We should also have ice-water for irrigation, and sponges or pads or, still better, cotton or gauze pads upon long forceps. Although the use of the curet is not painful, it is advisable for the patient to be under an anesthetic, as the fear of burning would be so great that an effectual application of the hot iron could not be made.

While the patient may not ask the character of the disease, her fears cause her to anticipate the worst, and her confidence in what is being done for her will be dependent upon its apparent gravity, and the abatement of the symptoms which follows the procedure permits her to secure new courage. It is well that she should be assured that we do not expect to remove completely the discharge, and that subsequent treatment may be necessary. She is thus saved from utter despair upon the return of the discharge.

The procedure is as follows: The patient, narcotized, is placed upon an operating table and the parts are cleansed as thoroughly as the condition will permit; the new formation is exposed with retractors and as much as possible of the tissue is scraped away with a sharp curet, reaching the firm infiltration zone. In the softer parts of the cancer the hemorrhage is considerable, but becomes less as the infiltration zone is reached, because there the vessels still retain their contractile power. To limit the bleeding, then, it is important to proceed rapidly with the curet. As we proceed, the scraped masses are removed by irrigation with ice-water, or, probably equally effectively, with water at a temperature of 120° F. The irrigation enables us the better to inspect the operative field. The finger must be employed occasionally to judge of the progress and of the amount of resistance, especially of thin points, particularly in the posterior vaginal vault and over the bladder, to assure ourselves that perforation will not occur, and that the new formation has been sufficiently removed. A smaller curet can be employed to remove further tufts in the uterine cavity. Shreds and ragged masses which elude the curet are seized with forceps and cut away with scissors, and the bleeding is controlled by firm pressure with gauze pledgets. A crater-like cavity is formed, which frequently can project into the parametrial tissue, which is further cleansed, and from which hemorrhage is arrested by the use of the thermocautery. In the most favorable cases cicatrization is produced. With cicatrization the cavity shrinks, and is much diminished. The action of the Paquelin thermocautery must be prolonged to be most effective. It must be frequently removed, because blood and shreds of tissue rapidly coat it. The removal is also done to permit the tissues to cool, that undue scorching may not occur at undesirable points. When the hemorrhage is quite profuse, it is important to bring the entire cavity at once in contact with the cautery. After the hemorrhage is incidentally controlled, we see, here and there, blood trickling and oozing from small points, which must be resubjected to the cautery until the cavity is lined by a thick, dry eschar. Especial care must be exercised toward the vaginal margin, for bleeding will continue there the longest.

To secure a deep, dry eschar, we use irrigation with ice-water at intervals only in the early part of the treatment, and later withdraw and cool the retractors, or retain them in the vagina and cool with pad wet with ice-water. If these precautions are omitted, the vagina becomes severely burned in prolonged operations. With the wooden retractors the danger of burning is lessened, but the long employment of the cautery will require an occasional cooling of the cavity. The procedure concluded, the cavity should be packed with iodoform gauze. Fritsch advises that the tampon be preceded by a teaspoonful of a powder containing equal parts of boric acid and tannin.

In properly selected and carefully managed cases the danger of the procedure is slight, and it can be accomplished without injury to the bladder or the peritoneum. Injuries to the latter are usually not serious. The hemorrhage may be considerable, though it is usually controlled without difficulty by the prolonged use of the cautery. A ligature is rarely required, for the cautery is competent to control even arterial bleeding. In the rare cases of inoperable cancer of the uterine body great prudence must be exercised to prevent the cautery from perforating the thin walls. The finger can generally enter the cavity, by which the weak places can be recognized and undue pressure against them avoided. The procedure is usually borne with but little discomfort. The patient will scarcely complain, unless we have unfortunately made an eschar upon the external genitalia, which is very painful and soon becomes edematous.

After the procedure is completed the vulva should be covered with vaseline, and, in the most trifling external burning, a pad should be applied, which is frequently wet with lead-water and laudanum, or a boric acid solution should be applied to the external genitalia. Slight elevation of temperature is generally noticed after such operations, but they exert no marked influence upon the general condition, and the temperature subsides in a few days.

Parametritis and septic processes are rarely observed. The tampon should remain five or six days. The eschar will be found to have partly separated under trifling suppuration, and the cavity will be more or less diminished. After withdrawal of the tampon the loose-lying tissues are carefully removed. The exercise of force must be avoided, because it causes hemorrhage. The cavity is sponged, and we await the complete separation of the slough. Our treatment after the removal of the eschar is directed to the securing of cicatrization. Olshausen lauds for this purpose tincture of iodin. He employs the stronger solution:

℞. Iodin. pur., ...	1 part
Rectified spirits, ...	8 parts.

It is applied by a saturated pledget of cotton, which is pressed lightly against the cervix. The superfluous portion flows back into the bowl of the speculum, from which it may be used over and over. The alcohol is an excellent antiseptic.

The patient should be advised to wear a napkin after the application to protect the clothing. The applications are made every two or three days until the cavity contracts and becomes clean. In favorable cases a watery discharge, sometimes tinged with blood, follows, which has entirely lost its offensive odor and is so slight that the patient considers herself cured.

Caustics.—Sims followed the use of the curet by an application of zinc chlorid solution. Hemorrhage was controlled by pledgets wet with a solution of persulphate of iron, which were removed and followed by tampons wet with the zinc solution. Van de Warker used a 50 per cent. solution of the chlorid of zinc. After the use of the curet small pledgets, squeezed from a 50 per cent. solution of zinc chlorid, are placed against the diseased surfaces. The healthy tissues are previously protected from injury by an ointment of bicarbonate of soda in vaselin. These medicated pledgets are so placed as to come in contact with the entire diseased surface; over them a piece of dry absorbent cotton or gauze is laid, after which the vagina is filled with a wad of cotton wet with a saturated solution of bicarbonate of soda.

The carbonate causes a decomposition of the zinc salt, which renders it nonirritating to the tissues. The nurse can press the superfluous agent out of the pledgets without injury to her fingers by first anointing them with vaselin. Without the precaution we have directed, the vagina, and especially the introitus, would be badly burned; indeed, in spite of our precautions the vagina is frequently seriously injured. Where the wall is thin, as over the bladder, the weaker solution (ʒvj to f℥j) employed by Sims should be substituted. Sims left the tampons undisturbed for four or five days, unless earlier removal was indicated by elevation of temperature. He ascribed to the agent no especial influence upon the cancer beyond its active destructive action, but Van de Warker believed the drug to have a special affinity for the cancer tissue, selecting it and leaving the healthy tissue; but the microscopic investigations of Ehler upon this subject demonstrate the contrary—that the cancerous tissue is only superficially affected, while necrosis of the healthy tissue extends to a considerable depth. Fränkel employs the zinc salt, but previously scorches the surface with the thermocautery. He leaves the pledgets in contact with the affected surface for twenty-four hours. Great care must be exercised in the cases for which this treatment is employed. Should the bladder or posterior vaginal wall be infiltrated, or if these parts are insufficiently protected, fistulæ may form, which greatly aggravate the subsequent condition of the patient; thus, the resulting slough may open the bladder, rectum, or peritoneal cavity. Severe hemorrhage may occur with the separation of the slough, which may produce a fatal result. After the slough has separated exuberant granulations develop, and later strong cicatricial contraction and shrinking, which Fritsch indicated as the cause of extraordinarily severe pain, which is aggravated by the increased infiltration above the scar tissue.

Ricard relates the history of a patient in whom hematometra and hematosalpinx occurred after the introduction of zinc chlorid pencils into the uterus. The scar tissue was so dense that the collection could not be reached per vaginam, and the woman perished from hemorrhage after laparotomy. The cervix and the greater part of the uterus had degenerated in cancer. Many patients in whom this treatment has been employed have been so much improved as fully to justify its practice in similar cases, but strong solutions and the paste should be absolutely interdicted.

Fraipont advocates the use of liquor ferri sesqui chloridi, by which he attained excellent results. This agent has a superficial action upon the surfaces to which it is applied, and forms a slough after the discharge, from which a hemorrhage is likely to recur. The bleeding following the curetment can only be incompletely controlled by pressure with an iron solution. A better application is a tampon of iron chlorid. Cotton is saturated with this substance and packed against the surface. These pledgets of cotton form hard lumps, which are difficult to move, and are only slowly separated under strong suppuration or discharge. An early attempt at their removal is attended with severe pain and hemorrhage.

Leopold advocates the use of concentrated carbolic acid, treatment with which continues from one to two months. After radical scraping and scorching with Paquelin's cautery, he supplemented this with quarterly scraping and the use of the cautery by plunging it into the new growths so that the tissue is rapidly scorched. Chrobak used, after cureting, repeated cauterization with nitric acid. Out of sixty-five cases so treated, he attained good duration results. In one of these cases, after radical sloughing of the carcinoma of the cervix three years and nine months later, because of the strong scar tissue, there had formed a hematometra, which was emptied twice. In another case, after repeated cutting away and cauterization, at the end of three years a strong scar formation, but no relapse, was shown. A third case still lived five years after operation, free of relapse.

M. Guinard, in 1896, and Etheridge, in 1898, have advocated the use of calcium carbide. In the treatment of inoperable uterine cancer a piece of calcium carbide the size of a small nut is introduced into the vagina, and iodoform gauze is quickly packed about it. It forms acetylene. Three days later the dressings are removed and the vagina well washed, the remains of the calcium oxid are brought away, the parts are dried, and a new application is made. The vegetations rapidly disappear, and there remains only a smooth gray surface, free from moisture. Etheridge claims that after a few treatments the edges of the cavity began to draw in, and the area of the crater was diminished. Its entire appearance impressed one with the idea that it had taken on an entirely healthy character. The cavity contracts until it is entirely obliterated, and puckers the vault of the vagina. Goodell advocated in inoperable cancer the use of applications of powdered pepsin and salicylic acid—pepsin to digest and eat off the diseased tissues, salicylic acid to prevent decomposition.

Parenchymatous Injections.—Various agents have been employed as injections into the structure of the cancer with a view to moderating its course or destroying it. Thiersch used nitrate of silver; Schramm, chlorid of sodium and sublimate. Mosetig-Moorhof and Stilling employed pyoktanin. Schultze has lately used injections of absolute alcohol in a large series of cases. Bernhardt employed a 6 per cent. solution of salicylic acid in 60 per cent. alcohol. Vulliet, independently of Schultze, has practised the treatment with absolute alcohol. Under this treatment the bleeding and discharge were trifling or ceased entirely. After ten or fifteen injections the evil smell of the discharge disappeared and the pain ceased. Treatment, in the beginning, should occur at intervals of a few days. During the intervals the vagina may be tamponed with iodoform gauze. In the course of weeks or months the ulcer heals and the infiltrate disappears. Schultze suggests that when the injection is in the neighborhood of the peritoneum, the after-treatment is painful. Schramm found the injections painful and without special influence. The treatment has to be continued over weeks and months—a requirement that we are able to carry out only in rare cases. Without question, better results will be obtained by the use of the curet and the thermocautery.

A. Martin, in inoperable cases, advocates suturing the wound surface occasioned by the curetment. The carcinomatous masses are removed with the sharp spoon and the parametrium is ligated; then, drawing down the uterine stump, strong curved needles are passed under the entire wound surface to the border of the neck or to the mucous membrane, and the thread is so secured that it brings together the wound surfaces created by the curetment. In a very extensive wound the entire pelvic body is protected by a mattress suture, when the mobility of the stump is so limited that it is impossible to accomplish the partial sewing of the wound surface. The vagina is so sutured in the depth of the crater that a continuous series of firm sutures come to lie about the opening. The operation, however, is impracticable, because frequently we have to clean out extensive cavities with strong infiltrated walls. The advantages offered by the method are that hemorrhage is securely controlled and that after-hemorrhages do not appear. The patient is spared the suppuration which follows the caustic, and it forms a firm scar. Houzel and Chrobak have seen good results from suturing. The method, however, is applicable only to a limited number of cases, and frequently offers great technical difficulties. Sutures will often cut through the carcinomatous tissue; sometimes the wound surfaces break apart, and suppuration again follows. The reported good results are less from the suture of the wound surface than from the union with the parametrium.

A class of cases will be found in which the disease is such that no palliative operation will afford relief. We must still endeavor to make the patient comfortable and to relieve the distressing symptoms. These are hemorrhage and profuse offensive discharge. The latter becomes so disgusting as to be distressing to the patient and to those about her. Local treatment is demanded. Syringing and tamponade with wet or dry dressings come under consideration. The control of hemorrhage is accomplished more effectually by the tamponade than by the syringing with astringents. Kehrer employed the tampon with cotton gauze saturated in an 8 to 10 per cent. solution of acetic alum. Iodoform gauze also exercises a good influence upon the smell of the discharge, but through a long employment the odor of the iodoform becomes persistent and annoying.

The dry treatment, introduced by Sanger and employed by Fritsch, often proves beneficial, though it requires medicinal help in order to carry it out. It may be employed alternately with injections. The dry treatment follows curetment and cauterization. Iodoform is blown into the vagina, which is then firmly tamponed with iodoform gauze. Tamponades covered with iodoform may be introduced, and may remain as long as possible. This treatment should be repeated once or twice a week for some time. It controls hemorrhage, but especially keeps down the unpleasant smell of the discharge. The unpleasant odor of the iodoform and the existing danger of intoxication have led to the substitution of tannin and boric acid and salicylic acid for similar purposes. Torggler employed charcoal powder with iodoform, which deodorized the mixture; the ulcerated surfaces were rapidly cleaned. Long-continued sitz-baths often have a beneficial influence and afford the patient great relief. When penetration of the bladder occurs, the patient may keep herself comparatively comfortable by wearing a urinal.

It is important that the patient should be kept out of bed as long as her strength will permit. When once she becomes bedridden, her condition is made worse, and the psychic depression is more marked. It requires the greatest cleanliness and most continuous care upon the part of the nurse to limit the occurrence of bed-sores, as the continuous and abundant discharge keeps the parts wet, and in emaciated persons with feeble powers of resistance the skin becomes broken and extensive bed-sores follow. In these enfeebled patients it is not to be expected that the loss of substance will be recovered, and scarcely that the wound surface can be kept clean. By the processes of absorption from the wound surface, and the breaking-down cancer, the patient soon has regular elevation of temperature, which aggravates the discharge. It is not worth while giving antipyretics for the elevation of temperature in these cases, as they have but trifling influence, and soon break down nutritive processes. A mixture of salol and aristol has been employed with advantage. When the patient is unable to be continuously under medical treatment, we must resort to irrigation. The entire series of antiseptic means have been employed; injections of permanganate of potash, one to two teaspoonfuls of 5 per cent. solution in a gallon of water, is one of the best. The drug is cheap, and possesses the advantage that the patient is using a substance that does not irritate or burn, is completely odorless, and is an excellent disinfecting fluid. It has the advantage over the phenols that the peculiar smell of the latter, mixed with cancer discharge, soon annoys the patient. Martin recommended for a deodorizing injection a solution of 3 per cent. hydrogen peroxid with 1 per cent. thymol. Various astringent fluids, as pyroligneous acid and alum solution, are favored.

If penetration of the bladder and rectum has already resulted, the condition of the patient is comfortless. We may use tampons saturated with fatty or oily mixtures, such as bismuth salve or carbolized oil. The discharge is thus sometimes held back, but the continued irritation of the parts results in an excoriation eczema of the external genitalia, which is a new source of torment for the unfortunate patient. In such cases the removal of the disagreeable odor is no longer possible. In patients suffering from edematous external genitalia covered with excoriations and ulcers, and from already existing edema in the lower extremities, irrigation is very difficult, and is practicable only under increase of pain. Covering the lower extremities with a rubber skirt, by which the odor is prevented from rising, has been advocated, but the moist warmth thus engendered soon renders it unbearable. Fritsch advocates completely covering the vulva and the inner surface of the thighs with frequently changed pads wet with chlorin water, thus to obscure as much as possible the offensive odor.

When the disease is far advanced, neither the greatest cleanliness nor the admission of fresh air to the sick-room is sufficient to drive out this odor, and the patient becomes a source of discomfort to herself and to those who attend her. Anorexia makes itself noticeable early. This is undoubtedly due to the influence of the sickening odor upon the appetite. Every form of food becomes absolutely repugnant, and we are obliged to confine ourselves then to the smallest quantities of liquid nourishment.

Sometimes these are more readily taken when cold. Patients frequently live for a remarkable length of time with scarcely any nourishment. The relief occasioned by the removal of the odor usually results in the improvement of the appetite. Obstinate constipation becomes a marked symptom, which also acts unfavorably on the appetite. When evacuation occurs, it is so extraordinarily painful, because of the hard infiltration in the pelvis, that the patients are constrained to avoid defecation in order to escape the pain. Large enemata are better than purgatives in such cases. Of course, if a rectal fistula exists, they can not be employed. The uncontrollable vomiting which marks the advent of a uremic condition is an exceedingly distressing symptom. Occasionally, the administration of diuretics will relieve it. The condition of the urinary secretion should be observed; any failure should be an indication to administer diuretics, by which the appearance of vomiting can be obviated.

In the later stages the third distressing symptom is pain, which can be avoided only by the free use of narcotics. The only hesitation in the administration of narcotics should be to avoid their too lavish use early. The patient who becomes accustomed to large doses of the narcotics, when she reaches a stage at which they are still more seriously needed will have become so inured to the drug that it is no longer useful. Early in the disease it is better to employ other agents as substitutes. Antipyrin has been found effective. In extensive infiltration involving the lateral and posterior parts of the pelvis this remedy is useless. Such cases are relieved by rectal suppositories containing:

℞.	Morphin sulph., ...	gr. $\frac{1}{8}$
	Pulv. opii pur., ...	gr. $\frac{1}{4}$
	Pulv. belladon., ...	gr. $\frac{1}{8}$
	Ol. theobrom., ...	ʒ ij.

Ft. supposit.

Such a suppository, given at night, relieves the distress, secures sleep, and enables us to avoid the larger doses of morphin. An additional advantage is that by such a combination we can increase the dose and give the patient the prescribed daily ration which she can use. Codein may be given in pill form. In the later stages of the disease only the subcutaneous employment of large doses of morphin will afford relief. Fortunately for the patient and her relatives, toward the end of the disease the compression and obstruction of the ureters occasionally cause sufficient uremia to obtund the general sensibility and lessen the discomfort. The soporose and comatose conditions are frequent, and increase the comfort of the patient. Cumston's proposition to relieve the obstruction by establishing a ureteral fistula or performing a nephrotomy should receive no consideration. In advanced stages Drszewczky claims benefit from an ointment of extract of condurango and vaselin.

577. **Pregnancy Complicating Carcinoma.**—We have already spoken of the occurrence of pregnancy as a complication of carcinoma—a complication which is fraught with the greatest danger to two lives. It was stated that the treatment would entirely depend upon the progress of the disease. Thus, if the disease was inoperable, and there was no possible chance for the mother, every effort should be made to prolong the pregnancy to full term or to viability of the child, in order that it should have a chance for its life; when, however, the disease is operable and there is hope for a radical cure of the patient, no consideration for the child should operate against the mother's chances. The continuation of the pregnancy is doubtful, and it is attended with improbability of the child being delivered alive. Danger to the mother is very greatly increased, with almost the certainty that the progress of the disease will be so rapid that at the termination of pregnancy the time for radical treatment will be found to be past. Under such circumstances the proper consideration is the life of the mother. If the pregnancy has not reached the fourth month, we may proceed to the removal of the uterus per vaginam. Emptying the uterus reduces its size and renders easier its subsequent removal through the vagina. In the fourth month the operation should be performed through the abdomen. Between the fifth and seventh months we may be governed by the condition as to whether we wait for viability or proceed to immediate operation. If the disease is apparently progressing rapidly, an operation should be done immediately, without regard to the child. We may resort to an abortion, and then operate through the vagina, or the abdomen may be opened. In advanced pregnancy Martin has advocated the supravaginal amputation of the uterus and the extirpation of the carcinomatous cervix by the vagina. The advantages of this procedure are that the abdomen is kept open but a short time, that the hemorrhage can be better controlled from below, and that the carcinomatous masses are not drawn back through the abdominal cavity. Of six patients thus operated upon, one died of septic peritonitis. In the last two months of pregnancy we have to consider the treatment which has in view the preservation of two lives. Cesarean section should be performed, which is followed by a Freund abdominal, the Zweifel combined, or, finally, the pure vaginal total extirpation. Of these procedures, the abdominal operation seems preferable.

We come next to the consideration of operable carcinoma in labor. Here we have the possibility of a spontaneous ending of labor through the diseased passages. This may be considered, if the disease is still in the early stages. If the carcinomatous infiltration has not involved the entire portio, and a more or less large zone of the uterine margin remains free and capable of dilating, the ovum may be thus extruded. When the carcinomatous masses can not be crushed by the head, they should be cut away with scissors or the thermocautery as a preliminary, and the child should be delivered by forceps or by version. If the ovum is dead, its size may be diminished by perforation or by piecemeal operation, whichever will end the labor most effectively and in the best manner for the mother. Following the delivery, we may consider immediate vaginal total extirpation, or its delay until the second week of the puerperium. The delay in these cases is suggested because of the size of the uterus. The advantages of the procedure, however, are that the uterus permits itself to be readily drawn down to the vulva, and that the wall of the vulva and the vagina have been so distended by the passage of the fetus that they do not afford an artificial hindrance. Occasionally, the size of the uterus affords difficulty. It can then be reduced by splitting it into two parts in the median line, in which the vaginal procedure would be preferable.

578. Summary.—In the consideration of the subject of cancer we have endeavored to present a comprehensive view of the methods by which the disease may be combated. Such a statement to the student, however, must be more or less confusing, so I propose in a summary to present briefly the indications for special treatment.

The two principal methods of treating operable cancer are by the abdominal and vaginal routes. The sacral method affords no advantages that render it worthy of our consideration. In cancer limited to the uterus, with that organ freely movable, not disproportionately large, with a relaxed, roomy vagina, the organ should be extirpated by the latter canal. When the uterus is large, and the disease has evidently extended to, if not into, the parametrium, and is complicated with myoma, ovarian tumor, or the later stages of pregnancy, or when the vagina is undilated and narrow, abdominal hysterectomy should be preferred. In performing radical operation two objections must be kept in mind: first, to extend the operation about the organ and to remove as much of the vagina and parametrial tissue as safety for the ureters and bladder will permit, thus getting beyond nests which may be situated in the parametrial tissue; second, the exercise of precautions which will avoid the implantation of cancerous material upon the healthy wound.

In the vaginal operation we have the choice of two methods of procedure for the control of hemorrhage. These are the use of clamps or the employment of a ligature. The clamp procedure has the advantage of being more expeditious, enabling us to remove the uterus in favorable cases in a very few minutes. It has the disadvantage that it produces an increased amount of pain, from the weight and dragging of the clamps and the necessity for the patient being confined to the dorsal position. The retention of the clamps produces a certain amount of necrotic tissue in the peritoneal cavity after removal of the clamp, and causes increased danger of septic infection. The removal of the clamps, often as late as forty-eight hours, is sometimes attended with quite free after-bleeding, which may require their reapplication, under very great disadvantage, in order to save the life of the patient. The ligature method is slower, but the hemostasis is more sure and the comfort of the patient is enhanced during convalescence. Catgut is preferable to silk for the ligature, because the latter ligature is likely to become infected, after which the silk will cause a sinus and a discharge, which continues until the ligature is removed, and causes worry and distress to the patient, inducing her to believe that the disease is returning.

In an abdominal hysterectomy the broad ligaments are ligated on each side external to the ovary and the tube. A peritoneal flap is dissected off in front, and the bladder and peritoneum are pushed off from the cervix. The ligature is applied on each side of this base, including the uterine artery, which can be felt with the finger. The broad ligament is separated, which permits greater mobility of the uterus; an incision is then made into the vagina posteriorly, and an incision is carried about the vagina, keeping well beyond the disease until the organ is removed. The parts are carefully inspected for bleeding vessels; any present are secured; then gauze is carried through the opening into the vagina, packed into the cellular tissue upon each side, and the peritoneum united over it by a continuous catgut suture; the abdominal cavity is cleansed and the wound is closed as in ordinary abdominal procedures. The gauze packing in these cases may be left in for from six to eight days in both the vagina and the abdomen.

579. **Deciduoma Malignum.**—A condition within recent years has been recognized as a form of malignant disease which is intimately associated with pregnancy. It has been described under the various names of deciduoma malignum, deciduomatous sarcoma, sarcoma deciduo cellulare, blastoma, deciduo chorion cellulare, syncytial carcinoma, syncytio malignum, the destructive bladder mole, destructive placental polyp, malignant chorion

epithelium, chorion, etc. These various designations indicate the difficulty experienced in fixing the exact relation of the condition. It is difficult to determine its relation to the cyst mole. Usually, the disorder is known to have been preceded by a cyst mole. In the cyst mole it is found that metastases have been carried by the veins to different points, and growths have followed with a similar epithelial structure. The peculiarity of these conditions, however, is that when the original site from which it has been derived is removed, the secondary mass, without interference, subsides and disappears. The disease is characterized by repeated bleeding after abortion, cystic mole, or labor, united with great inclination to destruction of the retained masses, to the formation of metastases, and to death, if extirpation of the uterus has not been promptly done. The disease occurs between the ages of seventeen and fifty-five years. It usually follows within a few months of the last pregnancy, though in Reinecke's case pregnancy had preceded three and three-fourths years. Diagnosis is possible in two ways: by clinical observation and by microscopic investigation. The patient, after labor, abortion, or cystic mole, has more or less of a continuous hemorrhage, which leads her to believe that something is contained within the uterine cavity. The cavity is emptied and the mucous surface is found to be smooth. A few weeks later a new hemorrhage begins, and one finds developed in the uterus one or several tumors, which spring broad-based or polypoid in the cavity. These should indicate the diagnosis of malignant deciduoma.

If the patient has been treated by another physician, and comes under observation after the curetment, one may be somewhat in doubt. The hemorrhage recurs, and a polypus is found, which may be considered a benign placental growth or mass. If such a patient is kept under observation a few weeks, the later recurrence of hemorrhage is full of significance. The patient, from the profuse discharge, is quite anemic, has a more or less yellowish appearance of the face, light edema of the skin, and often a foul, offensive discharge from the vagina. More important still are the size and form, as well as the situation, of the uterus. It should never be normal. The mucous membrane of the genital canal is pale. Metastasis in the vagina attracts attention. The cervical canal can be opened with the finger; if not, laminaria tents or Hegar's dilators may be employed. Introducing the finger, soft masses in the uterus are recognized, which can be examined under the microscope. The diagnosis of the mucous membrane from sarcoma is by no means easy. Under microscopic investigation it was found to consist of chorionic villi and muscle-cells, single serotina irritation cells, also large spindle cells in unaltered condition, with syncytial swelling. The uterine mucous membrane, in association with these conditions, presents nothing abnormal. The metastasis is not necessarily a proof of malignancy. In the benign cystic mole the same process occurs. The prognosis in this condition is exceedingly bad without radical therapeutics. If the individual has grown weak from severe hemorrhages, or if suppurative destruction has occurred, the patient may perish early from metastasis. Recovery is possible only by uterine extirpation, and the existence of metastasis in various parts of the body is no contraindication to the performance of the operation.

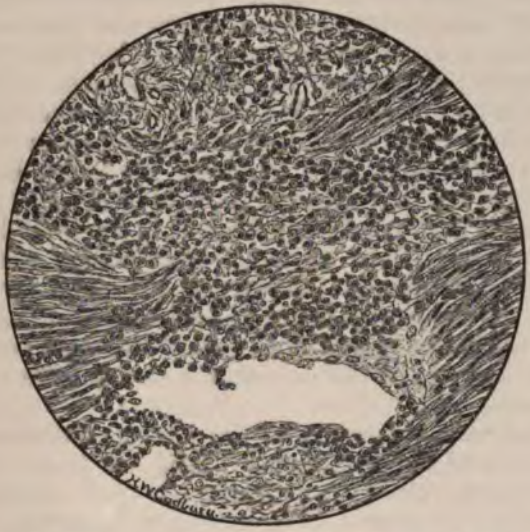

Fig. 490.—Round-cell Sarcoma of the Body of the Uterus. Section from Margin of Growth, Showing Infiltration of Uterine Muscle. (B. and L., $\frac{1}{6}$ in. obj.; 1 in. oc.)

580. Sarcoma Uteri.—Sarcoma of the uterus can involve either the mucous membrane or the wall of the organ, and hence is divided into two groups. Clinically, it is found either in the body or in the cervix, more frequently in the former, and this statement holds true in both its anatomic varieties. Sarcoma of the mucous membrane is one and a half times more frequent than the same affection of the wall.

581. Etiology.—The cause of sarcoma is unknown. Cohnheim's theory that it originates from some congenital defect affords no further information. In other parts of the body sarcoma is attributed to injury, but the occurrence of rapidly developing sarcoma following trauma is no indication that the latter is the cause. Injuries during parturition, difficult delivery of the placenta, frequent labors, and blows upon the sacrum have been assigned as causes for its development. Labor, however, does not seem to be a factor, as two-thirds of the cases are below the average in child-bearing, and in a great majority there is a long interval between the last labor and the development of the disease. The cervix is most subject to injury during labor, while the body of the organ is more subject to the disease.

Predisposing factors are: *Age.* The cases of sarcoma of the mucous membrane preponderate between the ages of fifty and sixty, although a large number are found between the ages of five and twenty; sarcoma of the wall is absent in the young, while the maximum number is found between the ages of forty and fifty. *Trauma, parasitic irritation, syphilis*, and the presence of *fibroids* are included, but, if factors, the query becomes important, Why are the cases not more frequent? Gusserow believed that it originated from changes in the fibroid, and Martin saw the disease follow the ergot treatment of fibroid in six cases. The latter number, however, is too small for a definite conclusion. *Heredity* as a factor is undetermined. *Poverty* has been given as a cause, but Weil has shown that one-fourth of the cases of sarcoma of the mucous membrane have occurred in the well-to-do.

582. **Anatomy.**—Sarcoma of the mucous membrane occurs in the diffuse and polypoid forms. It is not to be understood that the former involves the entire surface, like fungous endometritis, but it is a more or less circumscribed growth, the surface of which presents irregular projections, which give the new formation sometimes a roughened, again a villous, appearance. The polypoid variety is nearly three times as frequent, both in the body and in the cervix.

Sarcoma of the mucous membrane occurs in the body twice as often as in the cervix. In the latter it is found as grape-like masses, which frequently project from the external os by a pedicle. The diffuse form affects the body. Its progress is slow, and it extends upon the surface, showing marked reluctance to invasion of the subjacent wall. As it follows the surface it is manifested by large or small nodular, papillary, or villous projections. The mucous surface begins to degenerate, and hemorrhage appears. In rare cases the muscular structure is rapidly involved. Generally, the tissue involved has a reduction of the vascularity; when the vessels are especially abundant, the form is designated as the hemorrhagic or telangiectatic.

The appearance of a section of sarcoma is quite varied. The less the connective tissue is present, the more homogeneous it appears. Most generally it is marrow-like, and, in advanced stages, presents a soft, smeary, and very fragile mass. With an increase of the connective tissue the borders are folded and irregular, inclosing a homogeneous section. The structure undergoes marked changes under myxomatous alteration or serous penetration, and not infrequently apoplectic nests are recognized and cysts are formed.

The muscular walls are especially resistant, and become thickened, while the disease extends in the direction of the least resistance, which is into the cavity of the uterus. The uterus is usually not enlarged; when it becomes so, it is uniform. The uterus is hard or soft, according to the degree of extension. In rare cases the growth of the disease and uterine hypertrophy are simultaneous. Under these circumstances it attains to the size of a child's head; in rare cases it shifts to the internal os and causes severe hemorrhage, serous discharge, or purulent destruction. In rapid extension the tumor can reach the ribs. Occasionally, it penetrates the uterine wall, projects upon the peritoneal surface, involves the peritoneum or the intestine, results in suppurative peritonitis, and death rapidly follows. It can become encapsulated and penetrate the intestine or the abdominal wall, and form a fistula. Fistulæ of the rectum and bladder are rare in sarcoma, but frequent in carcinoma. The disease seems inclined to limit itself to the uterus, and metastasis to other organs occurs late. The disease can grow through the uterus and involve the parametric tissue, but this only in advanced cases. A polypoid growth may extend and fill up the uterine cavity and lie upon healthy tissue without involving it.

Sarcoma of the wall appears in a rounded form, with folded or lapped borders. The uterus is hypertrophied. Section of such a tumor shows a yellowish-white or grayish-red surface. The discharge is a milky, soft tissue, and its structure would indicate that it had originated in a fibromyoma. It is very difficult to decide whether the myoma is a cause or a coincidence. A myoma is not infrequently situated near a sarcoma of the mucous membrane, from which it can become involved. Polypoid growths are occasionally the size of a fist, and may have a broad base or a long, thin pedicle. When a polypoid growth pushes into the cavity, the remaining portion of the mucous surface may remain long uninvolved. The existence of the new formation develops an inclination to expel it as a foreign body, by which the os is dilated, and the tumor, hanging by a pedicle, is extruded into the vagina. Portions of the tumor may disintegrate and be discharged. The cervical form of the species is rare, but sometimes projects from the os as a grape-like cluster, which may fill out the vagina and may even project from the vulva. These polypi most frequently originate from the posterior cervical wall, and are soft growths, which show but little inclination to break down.

A second form resembles the cancroid, but is softer, less easily broken down, and does not so rapidly seize upon the other lip. The spindle-cell structure predominates in the cervical tumors. Myxosarcoma and angiosarcoma are very frequent. Sarcoma of the cervix shows but little disposition to invade the uterine body or the vaginal vault. It most frequently penetrates the cellular tissue of the parametrium.

Growths are described as spindle-celled or round-celled, according to the variety of these cells which predominates, as none are pure. The diseased structure is surrounded by a zone of irritation cells, which are difficult to distinguish from the small round cell. Weil reported the growths occurring in the relative frequency of 35 per cent. spindle-cell, 45 per cent. round-cell, and 25 per cent. mixed-cell tumors.

Ruge recognizes four groups: First, giant-cell sarcoma. The cells of the intervening gland tissue are largely increased. The cells—of round, sometimes spindle, form—are irregularly arranged, and their nuclei often exceed in size the usual cells. Second, the intermediate tissue cells, which are changed in the large spindle form to resemble the decidua cells. They are differentiated by their size, situation, and irregular form. Third, small round or spindle cells, between which lie irritation cells. Fourth, smaller round-cell sarcoma, which shows a great increase of cells, irregular in size and form.

The influence upon the glands of the mucous membrane gives variety. Generally, the glands are compressed and disappear, but occasionally they are retained, and form extensive areas within the tumor, producing what is known as adenosarcoma. The origin of sarcoma is difficult to fix; the microscopic appearance would indicate that it was from the coats of the vessels. A tumor in which there is a great increase of the vessels is known as an angiosarcoma.

Disturbances in nutrition cause edema and swelling of the cells; this condition simulates myxomatous degeneration, and has been called myxosarcoma. Lymphosarcoma is the name applied to those cases in which the disease originates in, and follows the course of, the lymphatic vessels. Myosarcoma is an engrafting of the disease upon a fibroid, and the term adenosarcoma indicates that glandular tissue has been included within the growth.

583. Symptoms.—Like carcinoma, sarcoma has no characteristic symptoms. Among the most important indications of its presence, or signs which should awaken suspicion, are hemorrhage, discharge, pain, and, in advanced stages, cachexia. Bleeding is the first symptom in over one-half of the cases, and is rarely absent. It begins as an increased menstrual flow; then a bloody, watery discharge, which is not sudden, as in fibroma, but more or less continuous. It comes from endometritis, while a stronger flow is indicative of destruction of the new formation. Rupture of vessels and more or less severe hemorrhage occur in the diffuse variety, but the polypoid form does not readily break down.

In the frequently recurring sarcoma of the mucous membrane in the climacteric hemorrhage is the first, and often for a long time the only, sign of the disease. The occurrence of the disease can cause pyometra or hematometra, and the development of a tumor which will reach the ribs, from obstruction of the discharge by the development of the growth. The collection in the uterus may be bloody or mixed with tissue, and often attains an enormous size. Discharge is the first symptom in about one-fourth of the cases, and does not cease with the further progress of the disease. It begins as a quite abundant, thin, watery fluid, which is later mixed with blood. This discharge, in the beginning of the disease, continues for a long time as the only symptom, and should arouse our suspicion of the presence of sarcoma. Such a discharge is not rare as a symptom of submucous fibroid, but its occurrence after the menopause is almost positively indicative of sarcoma. In the first stage it is without unpleasant odor, beyond a stale, sweetish smell; with the destruction of the new formation it becomes purulent, sanious, and has a foul odor. The carrion-like smell so characteristic of cancer is not usually present, because the large collections in the uterus are prevented by its contractions, and, owing to the better arrangement of the vessels, the new structure does not break down so easily. The disease mostly appears in the polypoid form; sanious discharge occurs, when the uterus forces the new growth out, thus dilates the os, and a portion is extruded into the vagina. The extruded parts are not so well nourished, and disturbances of nutrition favor further destruction.

The discharge in the vagina has abundant opportunity for exposure to infection from saprophytes, which accelerate the rapidity of destruction. The discharge is then mixed with ulcerating pieces of tissue, which are often discharged in large masses, and still further disintegrate in the vagina. A bloody discharge may follow, and a pyometra can occur, but never attains the same as the hematometra. Pain is absent in the beginning of the attack, but is aggravated with the increase in the size of the uterus, from the new formation, the persistent pressure in the pelvis, and the sensation of fullness of the abdomen. As the uterus is enlarged, the pain is referred to the ilium or to the sacrum, and radiates down the thighs. The extension of pain is due to the involvement of the uterine nerve-endings by the new formation. The pain is greatly aggravated when the disease has passed beyond the boundaries of the organ and infiltrated the pelvic tissues and made pressure upon the large nerve-trunks. In the polypoid variety the pain becomes labor-like when the structure attains a size which leads the uterus to expel it. The painful attacks are not so likely to occur at regular hours as in carcinoma. Cases of uterine inversion have been caused by efforts of the organ to expel its contents.

Vesical symptoms are comparatively frequent when the disease is confined to the uterus, and are manifested by more frequent desire to urinate, pain in emptying the bladder, and a striking vesical tenesmus. These symptoms are seen in the circumscribed variety, and are consequently not the result alone of increased weight.

In advanced cases constipation is marked, from the pressure of the infiltrate upon the rectum, and partly from decreased nutrition. Such patients apply for the relief of the constipation and of the pain at stool. The infiltration of the pelvis can attain to considerable dimensions, but, unlike carcinoma, shows but little inclination to compress the ureter. As the cervix is rarely involved, fistulæ of the bladder and rectum are infrequent. The constant drain will necessarily affect the general health, but the cachexia is greater than in cancer.

584. Duration.—The duration of the disease is difficult to determine, as the earlier symptoms do not come under the observation of the physician. Cases have been reported which have survived several years. The average duration is about two years, and the polypoid is the slower, probably dependent upon the slighter inclination of this form to invade the muscle-wall.

Metastasis occurs in about one-fourth of the cases, and affects any tissue of the body. Those structures most frequently affected are the lungs, peritoneum, lymph-glands, and intestine.

585. Diagnosis.—Sarcoma of the mucous membrane can be accurately determined only by microscopic examination. Other means will be sufficient to render certain the existence of malignant disease, but the variety is determined only by the microscope. Neither the condition nor symptoms offer anything characteristic of sarcoma, while a majority of the diseases of the uterus afford similar symptoms.

An elderly woman with a large uterus, who suffers from a profuse watery discharge mixed with blood, should awaken a suspicion of sarcoma. Submucous myoma sometimes causes a similar discharge, but the uterus is greatly enlarged, and it does not occur for the first time in advanced age, and is always accompanied with bleeding.

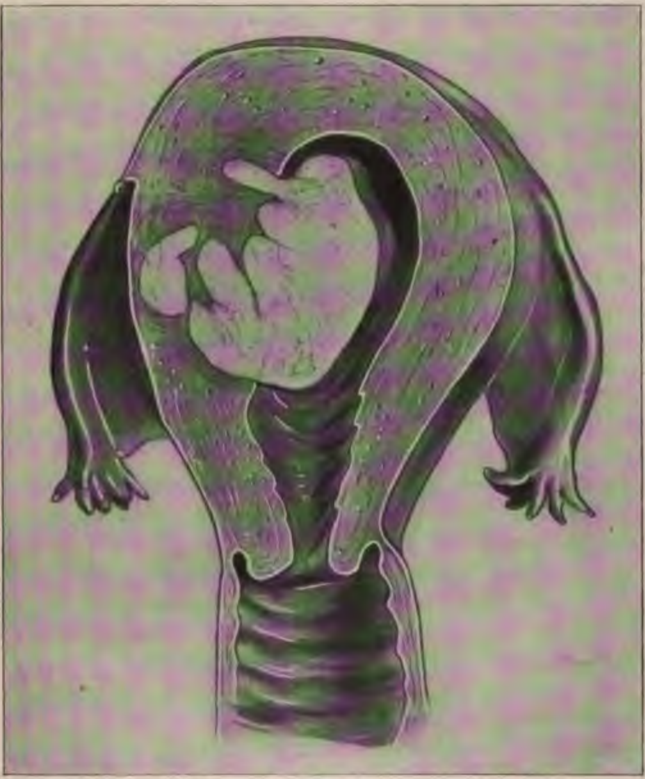

Fig. 491.—Fibroma Undergoing Sarcomatous Change.

Senile endometritis may cause a profuse discharge, but the discharge is purulent, and generally has a disagreeable odor. The organ presents the characteristic changes of old age, and is not large.

A second suspicious sign is vesical tenesmus, which should be regarded as an indication of malignant disease when no other cause exists.

Sarcoma of the uterine body is naturally difficult to diagnose. It can be completely covered by the cervix and the vaginal portion, and when a large cauliflower-like mass projects from the cervix, it can be either sarcoma or cancer, and the microscope only can determine which. In the differential diagnosis there are a variety of diseases which must make the diagnosis only probable.

The uterine body is always enlarged, but does not differ essentially from the enlargement of chronic metritis, myoma, and carcinoma. The sarcomatous uterus is not so hard as the myomatous organ. In malignant disease the very much enlarged organ indicates sarcoma, but the carcinoma may be superimposed upon a myomatous uterus. In the latter the form of the uterus is irregular.

Fungous endometritis, a mucous polyp, and submucous fibroid may require the use of the microscope to differentiate them. Positive proof of malignant disease is not obtainable by the touch. A sensation of softness is common to mucous polypi, submucous myoma, and mucous membrane sarcoma. Pieces of the latter can be broken off with the finger, as also from other growths when ulcerating. Touch with the finger is not always free from danger. It will be safer to employ the microscope upon the scrapings obtained by curetment.

The inexperienced investigator may be confused by the resemblance between sarcoma and interstitial endometritis, with more or less destruction of the glands. In doubtful cases examine all the parts removed before making the decision that malignant disease does not exist, and, if then in doubt, keep the patient under close observation. If she continues to bleed, make a second curetment, and again examine the scrapings.

The abundance and variety of the cells in a specimen are of significance in the diagnosis of sarcoma. In round-cell sarcoma the cells are round and thick, and exceed in size those of the intermediate gland tissue, between which are found irregular cells. Kellar places particular stress upon the fact that the individual nucleus is differently formed and varies in the way it accepts the color stain, so that the smaller nuclei are always better colored than the larger. When the glands are absent, the cells are usually pressed together and the epithelium is flattened. If the glands have largely decreased in interstitial endometritis, there are distinctive traces of connective-tissue formation in the intervening structure, which is penetrated in all directions by the migration of connective-tissue cells. They differ from spindle cells in that the long axis is drawn out at the ends, and the long axis of the nucleus does not fill out the body, while in the spindle-cell sarcoma the cells are smaller, plumper, only rarely with pointed ends, and the nucleus almost fills out the body.

The distribution of the vessels is also very significant. In benign changes of the endometrium the blood-vessels are few, and present distinctive walls, while in sarcoma they are much more abundant, and appear in immediate relation to the surrounding tissue of the growth. Amann asserts that the recognition of abundant nuclear division can be employed for the diagnosis of sarcoma.

In the differential diagnosis of subinvolution of the decidua and incomplete abortion the clinical history is of advantage; but if long-continued, irregular menstruation is followed by severe hemorrhage, perhaps an offensive discharge, while the uterus remains large and not especially hard, confusion with sarcoma is possible, which will require the microscope for confirmation, and then not always with certainty. The individual decidual cells closely resemble those of sarcoma of the mucous membrane. The retained tissue glands will present the alterations of pregnancy in their epithelium to such a degree that the error is easily avoided. The difficulty will be greater when a retrogression of the decidua has occurred, for the uniform structure of the decidua is destroyed. In single sections, however, individual islands of the decidual structure will be found, while other sections will show a great irregularity in the cells. The size of the cells is quite variable; frequently the decidual cells show a pronounced spindle shape, and penetration of the tissues by round cells exists, so that a structure is formed which is extraordinarily like a sarcoma. Differentiation is easily accomplished in such cases by demonstrating the chorionic villi. If we find the decidual cells by curetment of a woman who has had an abortion months before, we will also find the chorionic villi present, for the decidual cells are not otherwise so long retained. In the absence of the chorionic villi the diagnosis is fixed by finding, near the large decidual cells, sections of tissue which show the unaltered mucous membrane with retained glands or with the recognizable alterations of interstitial endometritis.

Tuberculosis of the endometrium, by the premature loss of the glands, through the appearance of numerous round cells in the tissue, and the occurrence of irritation cells, causes confusion with sarcoma. The clinical history, the demonstration of caseation, the peculiar irritation cells of tuberculosis, and the rarely demonstrated tubercle bacilli will protect against confusion.

Carcinoma of the Uterine Body.—There are certain forms of cancer which can not be distinguished microscopically from sarcoma. We can, however, determine that malignancy is present.

Deciduoma Malignum.—This is a condition which it will often be possible to determine by touch through an accessible cervical canal. But little satisfaction will be secured by examination of the tissue removed by the curet, as it will consist mostly of blood-clot containing a few pieces of necrotic tissue.

586. Sarcoma of the Cervix.—The grape-like sarcoma of the cervical mucous membrane, also called sarcoma colli uteri hydropicum papillæ, is a rare form of disease.

587. Anatomy.—The growth arises with a firm, more or less broad pedicle from the mucous membrane of the cervical canal, and projects from the external os into the vagina, showing a great similarity to a bladder mole. While the foundation part of the new formation in the cervical canal consists of firm fibrous tissue, the vaginal portion is strongly edematous, soft, almost fluctuating, and easily broken down. The growth has a pedicle, which is often thin and drawn out, and is made of a number of individual berries, which are so close together that they are flattened. They vary in size from a grain of corn to that of a grape. The stalk shows a smooth, moist, glistening surface, of a yellowish-white, brownish, or blue-black color—alterations which are produced by the entrance of blood into the tissue. The berries are often bluish in color; in single places vitreous. The berry contains a bright or light yellow fluid, and collapses upon its escape. These projections have about the appearance, if not the consistency, of a mucous polypus. The growth takes its origin from the superior layer of the mucous membrane, and assumes the grape-like form only after its extrusion into the vagina. This form is produced by interference with the circulation through pressure upon the pedicle, which causes edema and swelling of the intravaginal portion. The disease progresses slowly, and is often carried by metastasis through the blood-vessels. The individual cells are mostly of the roundish or spindle form. Between them is almost uniformly found a very fine intermediate substance. Parts of the new formation are divided by fissures or ramifying spaces, which, from the high cylindric epithelium and the nuclei situated in the cells, are recognized as the cervical glands. These glands are not sufficiently numerous to justify the appellation of adenosarcoma, sometimes given the condition.

The disease has been observed as early in life as two and one-half years, and shows a preference for the young and for the period of awakening sexual activity. In its beginning it produces symptoms similar to those of the mucous polyp, such as hemorrhage and discharge. During sexual activity there is first increase of menstruation, and then irregular discharge of blood. Pain is caused by the pressure of the increasing growth in the cervix. The extension of the disease to the parametrium causes pressure upon the pelvic nerves and the formation of masses which press up the uterus and lift it out of the pelvis. The hemorrhage and profuse discharge produce a high degree of anemia, and finally a cachexia appears. The patient ultimately perishes from marasmus and penetration of the suppurating tumor into the abdominal cavity with fatal peritonitis.

The duration of the disease is about the same as that of cancer of the cervix: viz., about one and one-half years. When the disease exists for some time, metastases form, and the disease extends to the vagina, where the involvement is superficial and does not interfere with cure by extirpation of the uterus, providing the operation is done early. To secure recovery the diagnosis must be made early, and not after recurrence of the disease following curetment or amputation of the cervix has demonstrated that the disease is malignant. The polypoid growths from the cervix should be recognized by their peculiar appearance, and the microscopic examinations of the scrapings from curetment should render the diagnosis certain. The re-formation of a polypus should lead to a suspicion of malignancy and to a careful microscopic examination to determine its true character.

588. Sarcoma of the Uterine Wall.—Sarcoma arises in the wall of the uterus either from the constituents of the wall or from the degeneration of a fibromyoma. The latter origin is regarded as the more frequent. It is often difficult to determine whether the disease has originated as a primary sarcoma of the wall or from a myoma. If the disease is recognized as situated in a myoma, or as surrounded by myomatous tissue, the latter is evidently its source; but if the myoma is associated with sarcoma involving the adjoining tissue as well, the origin may remain doubtful. Sarcoma of the mucous membrane over a myoma is not infrequently observed.

Fibrosarcoma usually exhibits a roundish growth. The entire new formation may present a degeneration into sarcomatous tissue, so that upon section it exhibits a soft, marrow-like structure, or may be somewhat firm and uniformly opaque, with moist or mottled surface. Frequently the tissue resembles fish-flesh. At other times the myoma has undergone sarcomatous change only in parts of its structure, and these points of degeneration give the section a striated appearance, in which the nodules are distinctly recognized. The sarcomatous degeneration is most frequently found in the center of the mass, so that it is surrounded by a myomatous crust. Gusserow's assertion that the fibrosarcoma continually loses its capsule is of no significance, for not every myoma has a capsule.

Fibrosarcoma can attain an enormous size, forming a tumor which reaches beneath the ribs. If the tumor is projected into the uterine cavity, it is generally covered by the mucous membrane which is not penetrated by the disease, and occasionally the tumor, thus covered, is extruded into the vagina. The submucous tumor mostly springs by a broad base from the wall of the uterus, in which no sarcomatous tissue is found. If the submucous tumor has attained a large size, disturbances of nutrition may have already occurred, which lead to suppuration. The longer the growth exists, the greater the inclination to destruction, especially if it is soft and has grown rapidly. In the submucous growth the uterus tends to enlarge, especially when the tumor is of the interstitial variety. On the other hand, the intraligamentary subserous sarcoma produces an enlargement or alteration of the uterus, which should not be overlooked.

These sarcomata, like the myomata from which they mostly project, are but slightly supplied with vessels, though they frequently have a distinct telangiectatic form.

Much diversity of opinion exists as to what constituent of the wall affords origin for the sarcoma cell. Virchow attributed it to the intercellular substance: "Their cells increase by division, they consist more and more of round cells, beginning small, later larger, with considerable nuclei, as large mucous bodies, while the intercellular substance is looser and more spongy." Kahlden believed that sarcomatous degeneration resulted from the immediate transformation of muscle-cells into roundish cells; their poles then became oval or blunted. Whitridge Williams says that under rapid increase of the number of cells this section of tissue passes into pronounced spindle-celled sarcoma with irritation cells. Ricker explains the growth "naturally by a growing through of myoma bundles by the side of the sarcoma tissue." Ruge says, "The impression exists, as if the fine, small muscle-cells passed over directly into the sarcoma cells." Gessner, from extensive investigations, concludes: "The round-cell sarcoma continually takes its origin from the connective tissue, and, likewise, the majority of the spindle-cell sarcoma; but that in all probability to the smallest part they lead back to an immediate transformation of muscle-cells."

589. Symptoms.—The great diversity of symptoms dependent upon the situation of the disease renders it impossible to present a clinical history. One of the first signs is the appearance of irregular bleeding in a myoma some time after the advent of the menopause. A myoma rarely delays the climacteric after the fifty-fifth year. The continuation of the menses at an advanced age, or their return after ceasing, should indicate the probable degeneration of an existing myoma. After the climacteric the myoma ceases to grow or decreases in size, while a sarcoma of the uterine wall increases. A rapid growth after the climacteric is, with rare exceptions, an indication of sarcomatous degeneration of the myoma. A symptom constant in sarcoma, and always absent in myoma, is a premature and rapid cachexia. By great loss of blood the myoma may cause anemia, but the sarcoma causes emaciation. When the cachexia occurs without much loss of blood, it indicates an unfavorable influence upon the blood composition and formation.

The cachexia is preceded by a sense of weariness, pain in the head, nausea, and sleepiness; then pain in the body, which can be attributed to the tumor; a sensation of tension in the belly, without marked increase in the tumor, or difficulty with urination, without compression being present, and disturbances of nutrition without assignable cause.

A profuse, watery-mucous or watery-bloody discharge occurs, similar to that from an ulcerating submucous myoma, except that in the latter the growth is not discharged in pieces, but the tumor retains its integrity and disintegrates from the surface, while in sarcoma large portions of the mass are thrown off or are easily broken off with the hand. Pain is produced if the disease breaks through the walls of the uterus, or if the latter undergoes great extension. Labor-like pains are induced if the uterus attempts to discharge its contents. Sarcoma occurs in but a small percentage of cases of myoma, yet sufficiently often to justify its being reckoned as a factor. While the possibility of this degeneration is no indication that every patient suffering from a myoma should be subjected to operation, it is a warning which should awaken suspicion when adverse symptoms develop in a patient thus affected.

Paget described a peculiar form of disease under the designation of "recurrent fibroids." Whether, in these cases, successive submucous fibroids were discharged or the condition was sarcoma, only the microscope could have determined. Schroeder made a vaginal extirpation in a case from which he had removed seven successive polypi, the last three of which were sarcomatous.

The removal of a sarcomatous growth long years after a previous removal does not prove that the former was malignant. The possibility of such change demands the more frequent examination by the microscope of such growths, in order that extirpation may be promptly resorted to when malignancy is demonstrated.

It is asserted that metastasis is late in its occurrence in fibrosarcoma. The assertion is correct only as to the length of time symptoms existed prior to such manifestations, but it does not indicate the long existence of sarcoma.

590. Duration.—When we remember that many of these cases arise in the degeneration of fibroids, in which it is difficult to fix the time when the degeneration began, the impossibility of fixing the duration of life will be appreciated. Cases have been reported in which a tumor has existed for ten years, but these are probably cases in which the myoma has existed for a long while and has only in the later years become malignant. Metastases appear late, follow the course of the blood-vessels, and most frequently involve the lungs, liver, rectum, omentum, kidneys, and pleura.

Fibrosarcoma is frequently regarded as a comparatively benign tumor, but this is incorrect, as its remaining proportionally limited to the uterine cavity is a property common to mucous membrane sarcoma and to cancer of the body of the uterus. If metastasis is any criterion as to malignancy, we must regard parenchymatous sarcoma as more malignant than the mucous, for, in the latter, metastases occur in only one-fourth of the cases, while in the former but one-fourth escape. While it is impossible to fix the duration of life, it would seem to be longer than in the other forms of malignant disease. Its progress is attended with the same symptoms as in other forms of malignant disease. Its termination, as in all forms of malignancy, is by death through exhaustion from bleeding and discharge, and by the further extension of the disease in the body. Sepsis plays a less important part than in the mucous variety, and ulceration does not appear so frequently, and, when present, by the discharge of the ulcerating mass does not generally cause general symptoms, though a purulent peritonitis has been frequently reported as a cause of death.

591. Diagnosis.—As in the mucous sarcoma, the diagnosis is made only by microscopic examination of the discharged or removed pieces of the growth. Greater difficulties are experienced in securing the material for study than in the latter. A suspicion that fibrosarcoma exists should be awakened :

First, if a myomatous tumor does not cease to grow after the menopause. Rapid growth does not always follow sarcomatous degeneration.

Second, if a woman with a myomatous tumor commences to bleed after the menopause. In rare cases this may occur in advanced age from mucous polypi, but the association of a profuse watery discharge should be held to be very suspicious of sarcoma.

Third, if with a myomatous tumor cachexia occurs. Through excessive bleeding myoma causes anemia, but never cachexia.

Fourth, if a myomatous tumor occasions symptoms which are explainable neither by the size nor the situation of the tumor.

Fifth, if ascites complicates the tumor. The possibility of its being caused by other conditions must be excluded. Ascites occurs from penetration of the peritoneum by the disease, and may follow a subserous tumor which has become sarcomatous.

Sixth, if a myoma which was previously hard grows rapidly, and becomes soft and swollen.

Seventh, if after the removal of a fibrous polypus another follows.

592. **Treatment.**—Whenever possible, the uterus should be extirpated. No other measures are worthy of consideration, but the case must come under observation sufficiently early to admit of the extirpation of the organ within the limits of healthy tissue.

Operation is contraindicated when the disease has so broken down the system of the patient that she will be unable to endure the ordeal of a radical procedure. It is also contraindicated when the growth is no longer confined to the uterus. The existence of metastases and the extension of the disease beyond the confines of the uterus would render operation of no avail. This assertion does not apply to extension upon the vagina, if the disease can be removed. The existence of ascites must not influence against the procedure unless the involvement of the retroperitoneal glands can be demonstrated. The removal of the entire uterus, even in slight cases, is indicated, because it affords greater immunity against return than any partial operation. When the size of the uterus permits, the operation should be performed by the vagina. This can usually be done in cases of mucous sarcoma, as the organ is rarely of large size. The fibrosarcoma may often be scraped out and the size of the organ may be reduced by the administration of ergot for a few days, and then the vaginal operation may be performed. It is not well to subject the healthy tissues to infection by cutting up the tumor to reduce its size.

593. **Relapse.**—The tendency to return of the disease seems greater in the fibrosarcoma than in the mucous growth. It is probable that the explanation of this greater frequency of relapse in the former is due to the earlier recognition and more prompt treatment of the latter. If a case of mucous sarcoma remains a year free from relapse, it may be considered a cure; but not so

the fibrosarcoma, for it has been known to return at a much later date. The great difficulty in the treatment of this, as in all malignant disease, is the impossibility of determining the diagnosis before the disease has extended beyond the point at which it can be surely removed. Our results must continue bad until both patient and physician have learned to realize that uterine hemorrhage is a symptom which demands prompt and thorough investigation.

When the disease has so extended that the radical procedure is no longer indicated, we direct our efforts to the arrest of hemorrhage, the decrease of discharge, and the improvement of the general condition of the patient.

594. **After-treatment.**—The patient should be kept upon her back, and the urine should be emptied with the catheter only when she is unable to void it spontaneously. If the bowels have not been evacuated, a laxative is given upon the third day. The appearance of tympanites should indicate the employment of stimulating enemata to promote the increased peristalsis. Usually, upon the second day the patient will rejoice at the great improvement in her condition. In the latter part of the first and during the second week it is not unusual for her general condition to be less satisfactory, with considerable elevation of temperature. This is readily occasioned by the extensive stump necrosis which occurs during this period.

If the abdominal wound is closed, the vaginal tampon of gauze may be permitted to remain for from six to nine days. If the belly wound is drained with iodoform gauze, it should be removed in five or six days. After purification of the vagina the gauze should be replaced. If the stumps have been tied with silk, it is not always possible to remove them all, and granulations often spring up about the ligatures and grow into the vulva, resembling a raspberry. With such a growth may result a similar process in the mucous membrane, so that a hen's-egg-sized growth projects from the angle of the vagina, which readily bleeds upon being touched, and at once awakens a suspicion of relapse. Bimanual examination, and especially microscopic investigation, disclose its true character. In the third week the patient is permitted to arise, and in the fourth to go about the house. When clamps are used instead of ligatures, the weight and dragging of these instruments increase the pain. The distress is aggravated by every movement, and frequently morphin may be required to make it endurable. The difficulty is often increased as early as the day after the operation by an accumulation of flatus. In the majority of cases the difficulty appears later, and is relieved only after prolonged rectal irrigation. The meteorism, increased abdominal sensibility, enhanced rapidity of pulse, and elevation of temperature produce anxiety, which is aggravated by prolonged vomiting and other signs of ileus. A number of cases are reported of a fatal result from kinking of the intestine. The continuation of such symptoms should lead to removal of the gauze, for fear that it is causing the obstruction. This is done with the recognition of the fact that the adhesions are not firm, and that trouble can arise from its premature removal. The cavity should be tamponed lightly. In the removal of the gauze care must be exercised that a knuckle of intestine is not drawn into the vagina. Such an accident occurred in one of my patients, where the interne withdrew the gauze and found that there was a large coil of intestine in the vagina, which he could not replace. I placed the patient upon her side with the hips elevated, and had no difficulty in replacing the intestine, which was kept in place by a gauze tampon. As to how long the gauze shall remain, operators differ—from the one or two days of Doyen to the ten days of Zweifel. The latter prefers the longer period because the earlier removal of the gauze breaks up the adhesions and draws down the intestines; at the later period the gauze has become loosened and the intestinal adhesions are so firm that they are undisturbed.

The clamps are generally removed at the end of forty-eight hours. Landau and Seligman remove them on the second day. I have had several cases of quite severe hemorrhage after removal at the end of forty-eight hours—hemorrhage which is difficult to control. The occurrence of hemorrhage requires resort to exposure of the cavity by retractors, and the ligament must be followed up and the bleeding vessels again secured with forceps.

Another objection to the use of clamps is the danger of injury to the ureter and the bladder, but this is due to want of care in pushing away these organs, and is just as likely to occur from careless use of the ligature. Injuries of the rectum are also reported, but are less excusable than those of the urinary apparatus. Among the causes of fatal result sepsis is the most frequent.

FALLOPIAN TUBES.

595. **Tumors (Benign).**—Tumors or growths of the tubes are exceedingly rare, except as a result of inflammatory changes.

596. **Fibroma or myoma** is infrequent and of small size. It develops from the muscular tissue of the tube, and may grow inward or become subperitoneal, but rarely obstructs the lumen of the tube. Inflammatory and tuberculous changes have been mistaken for myoma, particularly the condition known as salpin-

gitis nodosa. Under the name of adenomyoma or cystadenoma Recklinghausen describes a peculiar form of myoma which occurs only in the uterus and tube. It is characterized by the usual constituents of the fibroid, which include glandular structure. In the tube he attributes it to some remains of the primordial structure—the Wolffian body.

597. **Fibrocyst.**—A unique new formation is described by Sanger-Barth; it consists of three tumors collected from a conglomeration of various large cysts and firm tumors that were in part pedunculated from the fimbria of an otherwise healthy tube. Microscopically, the wall of the cyst consisted of fibrous connective tissue with smooth muscle-fiber, and, within, a nest of embryonic tissue. Its surface was covered with ciliated epithelium, and the contents of the cyst were detritus. The principal mass of firm tissue partly consisted of gelatinous myxomatous and partly of loose cell tissue. The products greatly resembled a teratoma.

598. **Enchondromata** are small, semitransparent, cartilaginous masses, which are occasionally situated upon the ends of the fimbriæ.

599. **Dermoid of the tube** is exceedingly rare. Ritchie describes a plum-sized bone removed from a dermoid of the tube. Pozzi, in a recent edition of his work, presents a diagram of a dermoid cyst removed from the tubal wall, which was adherent to the ovary. It had developed within the tube and ulcerated through the overlying wall.

600. **Cysts of small size** are frequent, though their true cystic character is denied. The large irregular bullæ so common in association with fibroid growths are said to be dilated lymph-spaces. Cysts varying from the size of a pea to that of a walnut are found in all the walls of the tube, but most frequently beneath the peritoneum. Cysts within the tube are not infrequently the result of inflammatory changes by which the adjoining folds of the mucous membrane become adherent. Cysts of the tubal fimbriæ become pedunculated and resemble the hydatid of Morgagni, which is by some regarded as a cyst. The cysts contain clear serum, colloid masses, or chalky bodies. Sanger divides these cysts into:

1. Serous cysts, which arise by the accumulation of serous fluid between the lamellæ of the new mucous membrane. They can attain the size of a child's head, and may be either single or double.

2. Lymphangiectasia and lymphangiectatic cysts in three forms: (*a*) As small vesicles upon tube and ligament, identical with those of older authors; (*b*) winding, ramifying tubes with

constrictions and cystic distentions; (*c*) lymphangiectatic cysts—large, tough-walled, isolated cysts in the tubal serous covering or the mesosalpinx. The two latter occur especially with uterine myoma.

3. The hydatid of Morgagni, regarded as a physiologic cyst of the end of a tubal fimbria.

Inflammatory cysts of the tubes—known, from the character of their contents, as hydrosalpinx, pyosalpinx, and hematosalpinx—have been discussed under inflammation. (Section 393.)

601. Polypus is a rarely recognized growth. Lewers reports a case in which, upon the inner surface of each dilated tube, were numerous growths, varying in size from a pin's head to a pea. Amann speaks of a growth of the mucous membrane consisting of connective tissue covered with enormously folded cylinder epithelium. Rokitansky and Klob describe connective growths of the fimbriæ.

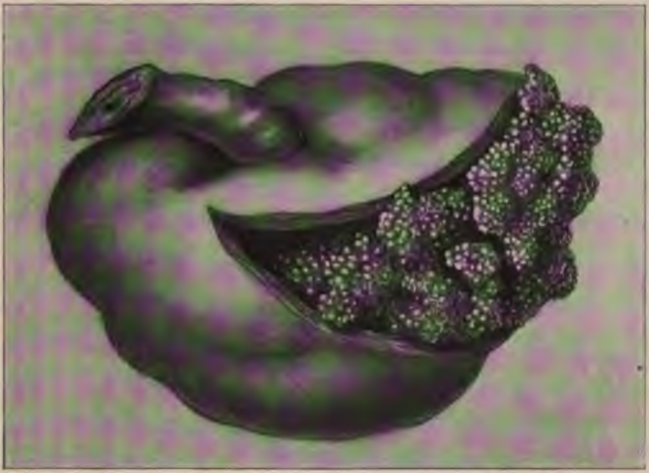

Fig. 492.—Papilloma of the Fallopian Tube.

602. Papillomata, denominated by Sutton as adenomata, are allied to the condylomata, or warts, found upon the vulva. The villus consists mainly of epithelium. Sanger has collected six cases, and divides them into two forms: (1) Simple cystic; (2) hydropic.

The simple cystic is an indefinite soft growth from the mucous membrane, of a cauliflower-like appearance, and its villous structure may fill out the tube and distend it into a considerable sized tumor.

In the second form (cystic and vesicular papillomata) the tubal end becomes closed and the villi are so swollen as to give the appearance of a cystic mole. This form differs from the first in the greater size of the cavity from the inner surface of which spring the papillary masses. Doran and Sutton have attributed the occurrence of papillomata to previous gonorrhea, but with such a cause they should occur more frequently. They are difficult to differentiate from sarcoma and cancer. Their benignity, however, is proved by the absence of any tendency of their epithelium to atypic growth, and there are no metastases.

603. Malignant Tumors.—Carcinoma of the tube may be either primary or secondary, though the latter is the more frequent. Secondary involvement of the tubes from cancer of either the ovaries or the uterus is comparatively late, as we not infrequently find the ovary forming a large tumor from cancer or sarcoma without any involvement of the tube. Doran divides primary cancer of the tube into two forms:

1. When the cancer develops in the mucous membrane of a normally formed tube.
2. When it forms in a malformed tube bearing a cyst the wall of which becomes infected.

In the first form its situation shows its origin in the papillary structure—whether from degeneration of papilloma, as believed by Doran, or directly from the tubal mucous membrane, as asserted by Sanger-Barth, remains to be determined. The occurrence of the disease in the middle and external portions of the tube indicates that it is a sequel of inflammatory trouble.

In the second form the disease develops in a cyst of the ostium. Doran describes a specimen in which the end of the right tube was dilated for an inch and a half, was very tortuous, and formed a tumor an inch in diameter at its widest part. In its wall was a solid deposit, over a quarter of an inch in thickness. At its outer part it communicated with a thin-walled cyst, situated in the anterior part of the broad ligament, lifted up its anterior fold, and raised the serous coat of the uterus. The cyst was about six inches in diameter, and its interior contained a thick deposit which appeared encephaloid in character. Under the microscope the stroma was scanty, with wide alveoli containing great masses of cubic epithelial cells, as in encephaloid cancer.

Amann is inclined to believe that cancer of the tube will prove to have developed through metastases from the uterus. The disease is generally confined to one tube. The recognition of its existence is necessarily difficult. When, after previous pelvic inflammation, a patient who has reached her forty-fifth year shows a sudden or steady growth of subjective and objective symptoms, cancer, says Doran, may be suspected, and watery or sanious discharges greatly increase the suspicion of malignancy.

Treatment should consist in the prompt removal of all infected structures.

604. Sarcoma of the ovary is frequent; of the tube, very rare. Occasionally, the sarcomatous nodules are found scattered over the peritoneal surface of the tube, but the disease more frequently passes from the ovary to the omentum. Kahlden reports a case in a woman of fifty-one years, in which the tube formed a sausage-shaped mass filled with soft cauliflower-like material. Under the microscope it showed various degenerations, such as round-cell and spindle-cell sarcoma, and a papillary structure wanting in connective tissue. These formations were found to arise from the endothelium of the lymph-vessels, which was increased several layers. As important constituents could be shown irritation cells similar to those in sarcoma.

605. Deciduoma Malignum.—Just as malignant degeneration can occur in a portion of placenta or chorion which is retained in the uterus, and produce a large tumor and subsequent metastatic deposits in the abdominal and thoracic viscera, a similar malignant change may follow an ectopic gestation in the tubal sac. Sanger advances this as an additional argument for active interference in such cases, and for the extirpation of tubal moles and of the appendages when tubal abortion has occurred.

BROAD LIGAMENTS.

606. Cysts of the broad ligament varying in size from a pea to a pigeon's egg are frequent, and generally of but little clinical interest. They may be situated upon the surface of the ligament or may lie deeply within its folds. Their walls are thin and the contents of the cyst consist of a watery or pale colored fluid. Superficial cysts are of undetermined origin, while the deeper growths are attributed to changes in the parovarium. I recently removed a multilocular cyst from the anterior surface of the broad ligament by opening the overlying peritoneum and enucleating the cyst. The ovary was not affected and was left undisturbed. These cysts are frequently pedunculated, but rarely attain to any great size. They are generally called microcysts, and are often developed in the structure or suspended from the organ of Rosenmüller. Only those which develop from the vertical tubes of the parovarium have ciliated epithelium and are liable to form papillary growths subsequently.

Parovarian Cysts. (Section 623.)

607. Echinococcus cysts are rare, except in certain districts, notably Iceland and Mecklenburg. They primarily occur in the pelvic connective tissue, and always near the intestine. The wandering of the parasite causes a chronic inflammation, characterized by round, elastic tumors situated near the rectum, which

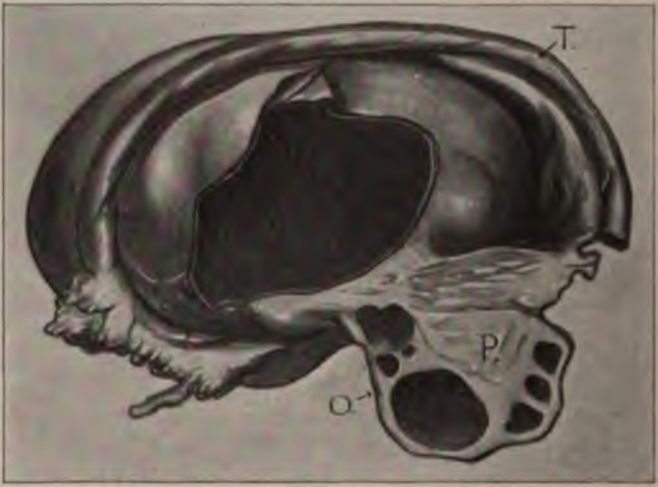

Fig. 493.—Broad Ligament Cyst.
T. Fallopian tube. P. Parovarium. O. Ovary.

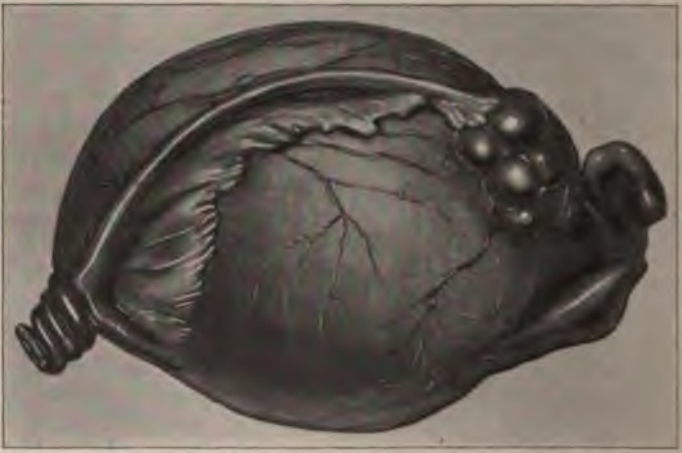

Fig. 494.—Broad Ligament Cyst, with Torsion of Its Pedicle.

are slightly movable, but not painful. Bimanual palpation reveals that they are not connected with the uterus or ovaries. A positive diagnosis is to be determined only by a careful examination of the fluid obtained from the cysts, either by spontaneous rupture or by puncture. The danger of infection from it is so great that the certain determination of the disorder will not compensate for the increased peril induced by the puncture.

Treatment.—The proper plan of treatment consists, when possible, in the removal of the sac. If we are unable to scoop out the cyst, then it should be fastened to the abdominal wall and drained. Pozzi advocates, when we have had to open the peritoneal cavity, that the opening over the cyst should be packed with iodoform gauze for from twenty-four to forty-eight hours, until adhesions have formed, before the cyst is opened, when it can be done without danger of infecting the peritoneal cavity. If the tumor is situated low in the pelvis, a vaginal incision should be preferred. The sac cavity should be emptied and packed with gauze.

608. Parovarian Varicocele.—Phleboliths.—A varicose dilatation of the veins of the pelvis is common, and frequently, according to Klob, results in the formation of phleboliths. Their frequent occurrence is attributed to the rare presence of valves in the veins of the broad ligament. These masses attain the size of a pea or bean, and occasionally cause inflammation and thrombus formation.

609. Lipomata.—Small collections of fat are not infrequently found in the mesosalpinx of the broad ligament near the under surface of the tube. They can attain the size of a bean, occasionally the size of a walnut.

610. Fibroma.—As the same muscular structure is found in the broad ligament as in the uterus, it is not surprising that fibroids should occasionally be found in the ligament independent of the uterus and its structure. Such growths may spring from the round ligament or are found in the large ligament. The latter have been considered as original uterine fibroids which have become separated from their first attachment. Sanger found these growths most frequently upon the right side. They may be situated intraperitoneally, in the fold of the groin, or in the labium majus. The mass may have a pedicle or may be sessile. It does not attain a large size, is quite movable, and is not painful. The condition may be confounded with fatty hernia, an epiplocele, or an ovarian hernia. The fatty hernia is frequently reducible, painful to the touch, quite soft, and ill defined. The irreducible epiplocele becomes like a fibroid, but has a cord stretched behind the abdominal wall. In an ovarian hernia the tumor retains the shape of the organ, is exceedingly sensitive, and increases at each menstrual period, while the uterus is displaced to one side. The treatment is extirpation.

611. Malignant Growths.—Carcinoma and sarcoma of the broad ligaments are usually the result of extension of the disease from the uterus or ovaries. The rectum, the bladder, or the retroperitoneal glands may be the source of the infection.

OVARIAN TUMORS.

612. Characteristics.—The tumors of the ovaries differ from the neoplasms of the other portions of the genital tract in their greater propensity to malignant degeneration, often rendering it difficult to determine whether an individual growth is malignant or benign. For this reason we will depart from the custom we have previously followed and discuss the two classes of tumors together.

613. Classification.—The tumors of the ovary may be divided, clinically, into cystic and solid; pathologically, into simple, proliferating, dermoid, and parovarian; and according to size, into small and large. The cystic comprise the simple, the proliferating, and the dermoid. The solid tumors, less frequent, are the fibromata, the sarcomata, and the carcinomata. Cysts may originate in any part of the tubo-ovarian structure, as the cortical, medullary, or parenchymatous portions of the ovary; in the structure between the tube and ovary known as the Rosenmüller organ or parovarian structures; and in the hydatid of Morgagni, the extremity of the canal of Müller. We have already spoken of cysts which develop in the folds of the broad ligament and are recognized as broad ligament cysts. Cystic growths may become of almost unlimited size, larger than any other growth of the body, and occasionally the body may seem but an appendage of the tumor. These growths repeatedly reach the weight of 100 pounds. Maritan recently reported an ovarian cyst weighing 200 pounds removed from a woman who previously weighed 290. Her girth measure was ninety inches.

The solid tumors closely retain the shape of the ovary. The cystic are irregularly spheric; the more spheric, the larger they become. As a rule, the surface is a bluish-white, greenish, brownish, yellow, or a glistening white. Secondary developments may occur in the wall, giving it an irregular shape, or it may consist of a large number of small cysts, which give the impression of a solid tumor.

Cysts are still further divided into unilocular or single cysts, and multilocular, where the sac is composed of a number of cavities or smaller cysts. Careful examination of a unilocular cyst will not infrequently show smaller cysts within its walls.

The contents of the various tumors greatly differ; indeed, the different cysts in the same tumor show radically different contents. In the unilocular tumors the contents are usually clear and limpid; in the multilocular, thick, viscid, and glue-like in some, clear and limpid in others, while, from various causes, there may be discoloration by an admixture of blood, pus, or fat.

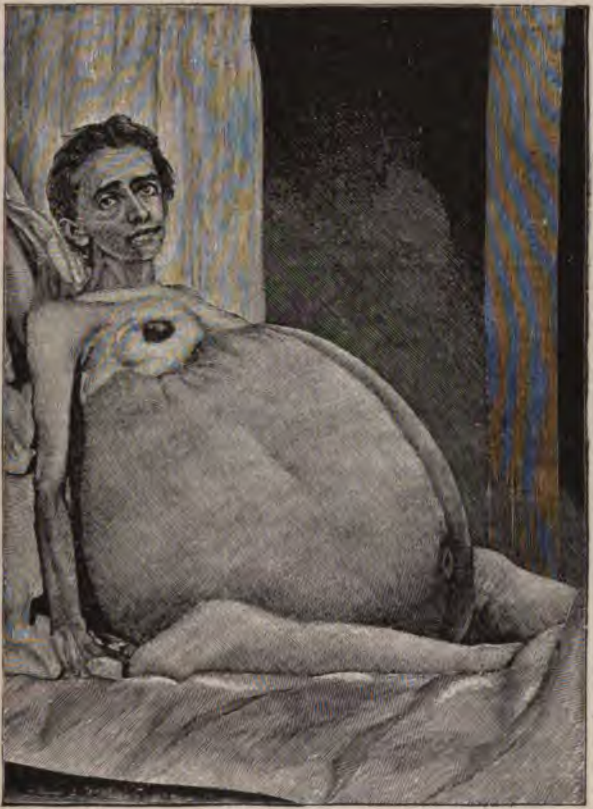

Fig. 495.—Large Ovarian Tumor.

The broad ligament cysts are generally unilocular and contain a clear fluid; those which originate in the hilum are papillary; and those from the parenchymatous structure of the ovary, glandular.

Small Cysts.—The small cysts may be described as, first, small residual cysts which develop from the horizontal canal of the parovarium, to which may be added the hydatid of Morgagni; second, follicular cysts; third, cysts of the corpus luteum; and, fourth, tubo-ovarian cysts.

The large cysts are, first, the glandular proliferous; second, the papillary proliferous; third, the dermoid, simple and mixed; fourth, the parovarian, including several varieties, as the hyaline, the papillary, and the dermoid.

614. Small residual cysts are cysts which develop in the structure between the tube and ovary, known as the parovarian structure, or the organ of Rosenmüller. Those which develop in the vertical tubes have ciliated epithelium, and may subsequently develop into papillary growths. They may become detached from the ligament and hang from the peritoneal surface by a slender pedicle. It is possible that from these cysts may originate large cysts filled with either fluid or papillary contents.

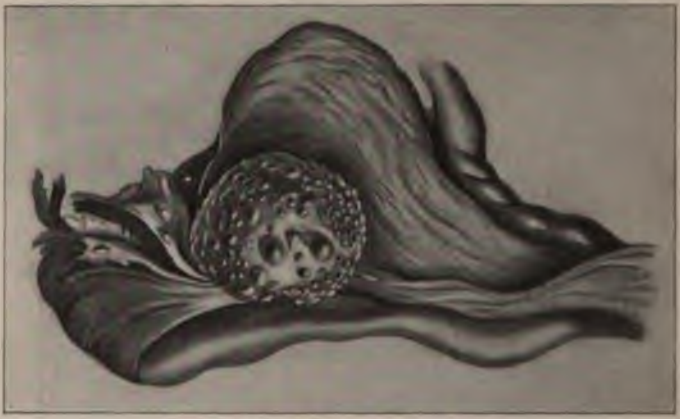

Fig. 496.—Small Residual Cysts.

Attached to the fimbriated end of the tube is generally found a small cyst, varying in size from a pea to a cherry, known as the hydatid of Morgagni, which, from its almost continuous presence, is regarded as a physiologic cyst. This hydatid is the termination of the duct of Müller. It is transparent, has a thin wall, and has a pedicle often a full inch in length. Doran describes a supratubal cyst of similar size, appearance, and structure, which he supposes to be a microcyst of the broad ligament in this anomalous position.

615. Simple or Follicular Cysts.—Hydrops Folliculorum.—These cysts are unilocular dilated follicles, generally multiple and small. In an ovary that has not attained to twice its normal size, fifteen to twenty of these cysts may be found. When small, the ovary is but slightly enlarged and the follicle projects upon the surface or lies embedded in the stroma. These cysts were long considered the sole source of large ovarian cysts, but it is only in rare instances that they attain the size of a fist, occasionally of a man's head. The contents of the cyst are generally clear, but may be blood-stained, and have a specific gravity of from 1005 to 1020. The cyst-wall is a transparent, thin membrane of a light gray color, covered with columnar epithelium. The cysts may be few and the stroma excessive, or the former may be very numerous and the latter scanty. When the latter condition is

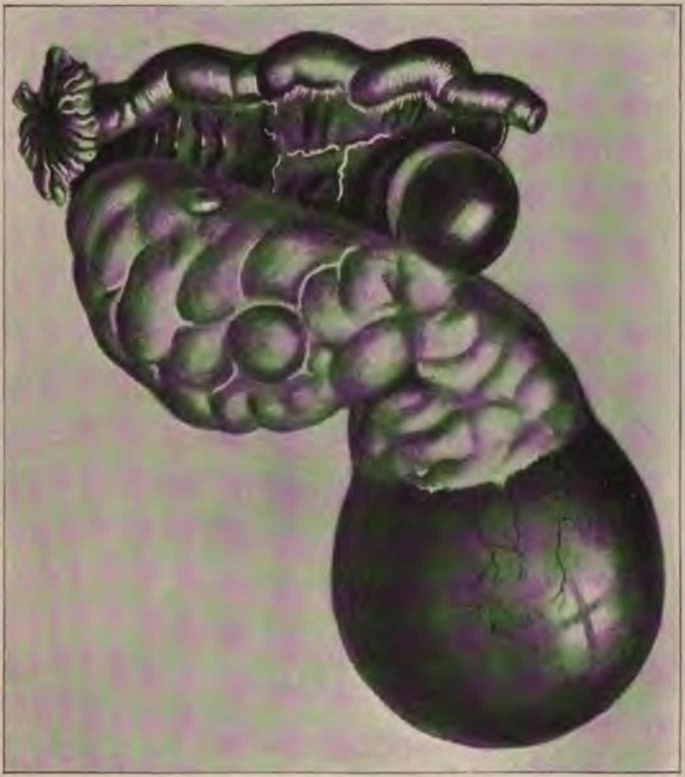

Fig. 497.—Cyst of the Corpus Luteum.

present, the ovary is frequently converted into a mass of delicate cysts. It is not unusual to find an ovary otherwise healthy containing a unilocular cyst the size of a hen's egg. The disease is generally bilateral.

Etiology.—These cysts, even when large, are regarded as unruptured and dilated Graafian follicles, because of the gradations observed between them and the smaller cysts. In the smaller ones ovula may be detected, which have been destroyed or have escaped observation in the larger. Failure to rupture and increase of the fluid contents produce a dropsy of the follicle. The normal rupture may be prevented by undue thickness or toughness of the walls, the result of inflammation; by deposits of exudation over the surface of the ovary; or by the deep situation of the developing follicle; or failure may be the result of too slight congestion, which, though increasing the secretion, is too gradual to produce rupture. Such cysts have preceded menstruation, being occasionally found in the fetal ovary. These cysts rarely give rise to symptoms, as menstruation, ovulation, and pregnancy continue.

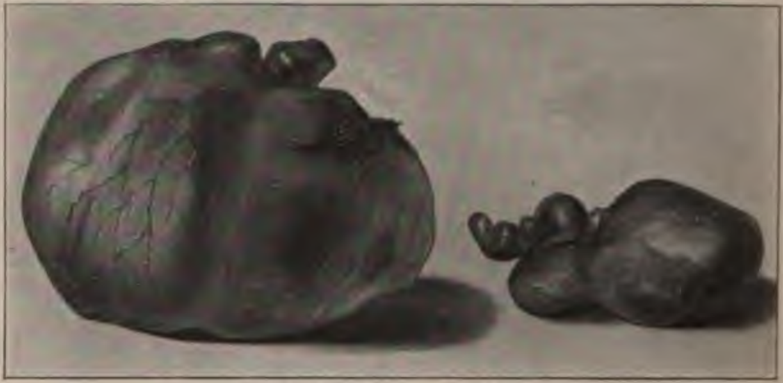

Fig. 498.—Tubo-ovarian Cysts.

616. Cysts of the Corpus Luteum.—These are unilocular cysts the size of a pigeon's egg, occasionally as large as an apple. They were first described by Rokitansky, who believed that only the corpus luteum of pregnancy could be thus transformed, but such cysts have been found in nulliparæ. The cyst-wall is comparatively thick, lined by a yellow, apparently folded membrane, in which microscopic examination shows the bud-like papillæ characteristic of the corpus luteum. The recognition of this structure prevents their confusion with follicular cysts, or even with suppurative ovaritis.

617. Tubo-ovarian Cysts.—An ovarian cyst in contact with a distended tube not infrequently results in the formation of a tubo-ovarian cyst. The tubal inflammation early results in the formation of extensive adhesions fixing the tubal ostium to the ovary. The increasing pressure of the accumulating fluid grad-

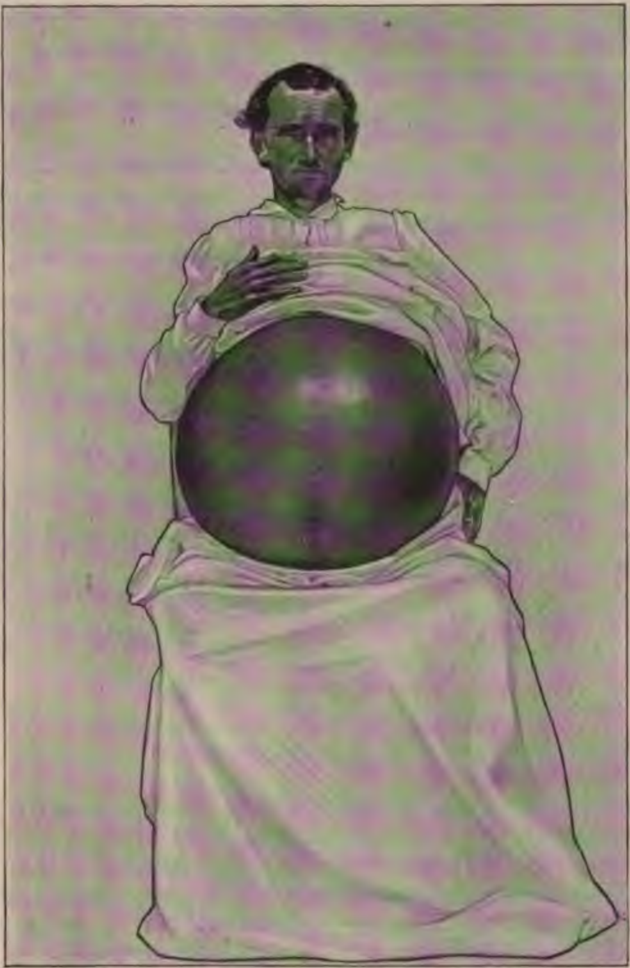
Fig. 499.—Large Ovarian Cyst. Patient Upright.

ually absorbs the thin septum until the two sacs form one cavity, the smaller portion of which is usually formed by the tube. It does not generally attain a large size. The uterine end of the tube may remain permeable, and, as the fluid increases, permits the excess to drain through the uterus, forming a condition known as profluent tubo-ovarian hydrops. It resembles the condition engendered in hydrosalpinx, known as *hydrops tubæ profluens*. The open tube acts as a safety-valve, preventing the increase and overdistention of the cyst, frequently leading to its complete collapse after every evacuation.

618. Large Cysts.—Proliferating Cystomata.—This class of cysts comprises the great majority of ovarian tumors, and they vary from the size of an egg to that of a tumor weighing over one hundred pounds, which may fill up the entire abdomen and encroach upon the thoracic viscera. The surface of the cyst presents a pearly-white, glistening appearance, the thinner portions of which are purple, green, or black, according to the color of their individual contents. The external surface may be smooth, oily, and covered with papillary growths or mucous vegetations.

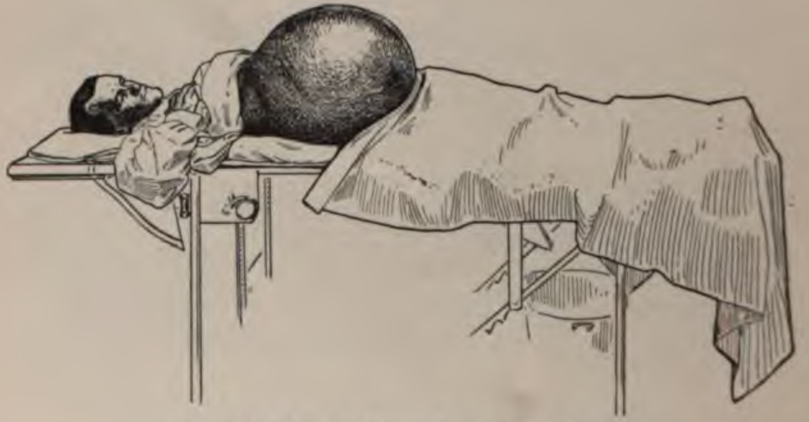

Fig. 500.—Ovarian Cyst. Patient Recumbent.

The term proliferous is applied to those which are highly organized and abundantly supplied with blood-vessels. The term proligerous is given to cysts that have the faculty of budding or generating new cysts from or within the original growth. They may be spheric in shape and regular in outline, simulating a single cyst, or may be irregular from the numerous nodules, indicating the presence of a multilocular tumor. These growths generally have a distinct pedicle.

619. Pedicle.—The attachment of the tumor may be pedunculated or sessile. The latter are frequently intraligamentary. The pedicle may be long or short, thin and band-like, or broad and thick. It is developed by the traction of the tumor and the resulting hyperplasia of the ovarian ligament, and by stretching of the meso-ovarium, of the side of the broad ligament, and of the suspensory ligament of the ovary. The tube generally remains separated by its mesosalpinx from the tumor, though the ampulla is often fastened to or approaches the tumor, because of the strongly drawn infundibular ovarian ligament, and the tube is usually elongated. In ovariotomy the tube is generally removed with the pedicle. After the removal of the tumor the cut surface presents a triangular appearance, in which the angles are pointed or blunt, small or large, and formed by the stump of the ovarian ligament, the transverse section of the tube, and the stump of the spermatic artery. The pedicle consists of smooth muscle-fibers, connective tissue, and hypertrophied blood-vessels.

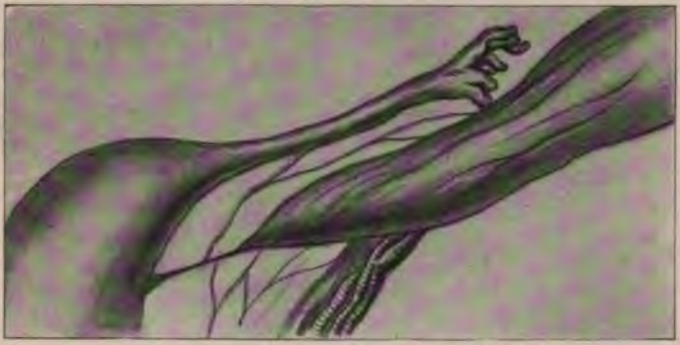

Fig. 501.—Pedicle of an Ovarian Cyst.

The pedicle varies in length from four to twenty centimeters; in breadth, from two to twelve centimeters; and may be entirely absent. The difference in the development of the pedicle is due, in part, to the insertion of the ovary upon the posterior surface of the broad ligament, and partly to the origin and growth of the tumor.

With the ovary originally embedded in the ligament, the development of the cyst in its external part will result in the formation of a pedicle; but the growth of the cyst toward the hilum may result in the spreading-out of the broad ligament and the formation of a subserous cyst. A cyst growing outward through the ligament may cause it to split and form two pedicles. As a tumor develops inward in an embedded ovary, and spreads out the ligament, the uterus is pushed to one side, and the tumor fills up the side of the pelvis, to displace the pelvic organs in general. Such a tumor becomes firmly fixed in the pelvis, pushes the peritoneum off from the uterus, invades the space between it and the bladder or rectum, and not infrequently partly spreads out the uterus upon its surface. Such growths are known as intraligamentary cysts. The cyst may be only partly subserous, having spread out the anterior wall of the broad ligament in advance of it, so that the inferior surface of the tumor is uncovered by the serous membrane. The separation of the posterior leaflet in such a growth reveals a long pedicle formed by the anterior fold. As an ovarian tumor develops, its increasing weight carries it backward into the retro-uterine pouch. It is very rarely found in front of the uterus. The subsequent development causes it gradually to fill the pelvis until its size no longer permits it to remain below the brim, when it rises into the abdomen. With the change of position there is a partial rotation of the pedicle, which is without clinical significance unless it exceeds a quarter of a circle. Occasionally, the withdrawal from the pelvis is retarded by a marked projection of the

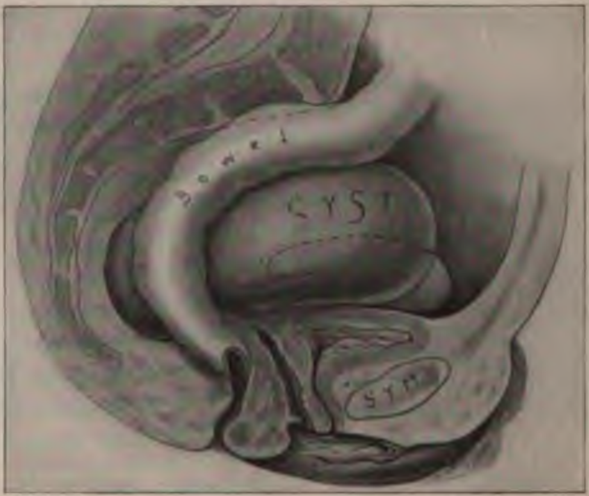

Fig. 502.—Intraligamentary Ovarian Cyst.

promontory of the sacrum, a roomy pelvis, or extensive adhesions. Such a tumor as it increases in size compresses the pelvic viscera, forces the uterus and bladder upward, and may dissect downward until it protrudes at the vagina, as in a case under my observation, which was covered only by the posterior vaginal wall.

The nonpedunculated tumor, as it progresses, becomes limited by the lateral walls of the pelvis, after it has spread out the structure and come in contact with the parametrium. In its further growth it is pushed upward and to the opposite side, carrying the uterus. These changes frequently displace the sigmoid portion of the colon, placing it above and in front of the tumor. The intestine is frequently compressed, but not sufficiently to close its canal, and the large vessels are often obstructed.

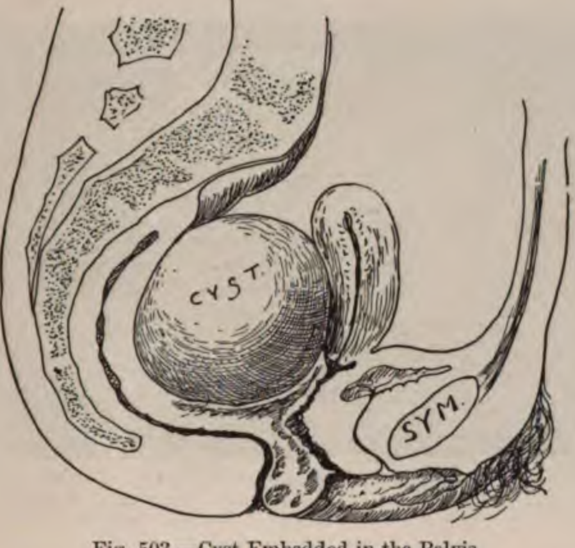

Fig. 503.—Cyst Embedded in the Pelvis.

The presence or absence of the pedicle depends somewhat upon the variety of the cyst. The glandular incline to a long pedicle, the papillary to a short or absent pedicle, and the dermoid to a short, strong pedicle.

620. Structure.—The consideration of the internal structure of the glandular cysts justifies their division into areolar, unilocular, and multilocular. These glandular cysts, according to Virchow, originate in an invagination of the proliferating ovarian epithelium into the stroma. Further invagination and proliferation of the tissue result in the formation of new gland tubes, from which new cysts form. The continuation of these processes results in the formation of the many-chambered glandular or adenomatous cyst.

Areolar Cyst.—A conglomeration of small cysts with a thick, well-developed, and vascular stroma is known as an areolar ovarian cyst. A number of these cysts may have ruptured to form a considerable sized one, or the tumor may consist of a very large number of small masses, none of which will exceed the size of a plum.

Unilocular cysts often attain an enormous size, but examination discloses evidences of their previous division into numerous

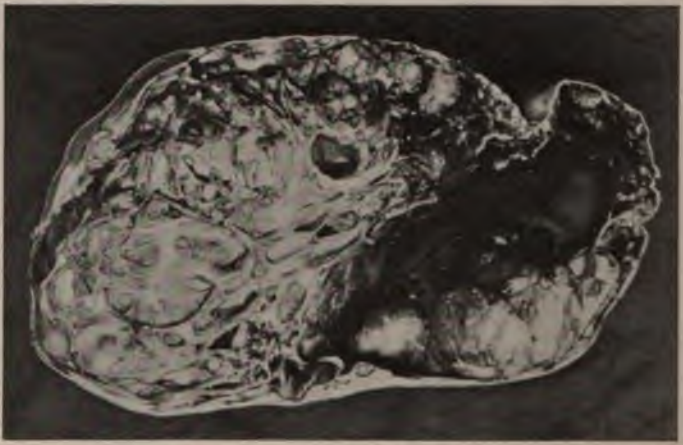

Fig. 504.—Areolar Ovarian Cyst.

smaller cysts, so that we can safely assert that all unilocular cysts originate from the multilocular. The investigation of a large cyst will usually show the presence of small cysts in its walls, and not infrequently the remains of septa within its cavity.

Multilocular cysts contain a number of cysts of varying size, so arranged as to present the appearance of a single tumor. As these individual sacs increase, their intervening walls become gradually thinned, until, one after another, they rupture and the sacs coalesce to form larger single chambers. Not infrequently the circumference of the septa remains, to become still more stretched as the tumor grows, until it forms a cord-like thickening upon the inner surface. Occasionally, the vascular structure alone remains to indicate the former septum. In sudden rupture the vessels of the septa are torn, producing extensive hemorrhage into the sac, which changes the character of the cyst-contents.

In the principal cyst we usually find a wall of three layers, the outside consisting of pure connective tissue, like the albuginea of the ovary. The middle layer consists of loose connective tissue with numerous large vessels, while the inner layer is rich with cells and contains numerous small vessels.

The external surface of the cyst is covered with columnar epithelium, which differs from the pavement epithelium of the peritoneum. The cysts are lined with a one-layered cylindric epithelium, which presents different forms in different tumors, and by its structure governs the character of the secretion in the various sacs. It is only in the smaller sacs, however, that the true similarity of the epithelium and secretion is observed. In the larger cysts the epithelium undergoes degenerative changes; is flattened by pressure; suffers disturbances of nutrition through thinning of the septal wall; and undergoes fatty or albuminous changes, which cause the epithelium entirely to disappear from the wall of the larger cysts. Epithelial sprouts may remain upon the wall, forming new growths.

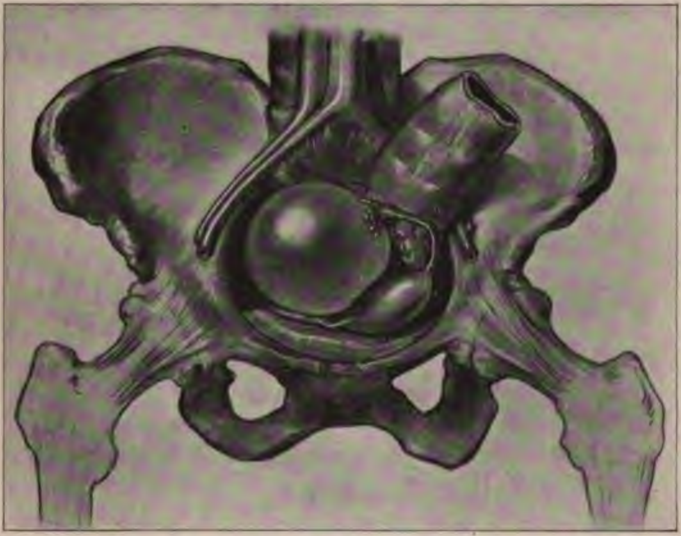

Fig. 505.—Unilocular Cyst.

Pfannensteil directs attention to the possibility of the formation of papillary growths in the adenomatous cysts. This formation is of great variety, and is found inside as well as upon the surface of the tumor. Sometimes these growths are but sparsely distributed upon the inner surface of a large cyst; in others they appear as circumscribed tufts upon one side, while the remaining portion is smooth; or, again, the entire cavity may be filled with strong, branching growths, while the quantity of fluid is very scanty. The larger the cyst, the greater the probability that a large portion of the wall is smooth. As a rule, the papillæ are most marked upon the side of the cyst toward the hilum, while the peripheral side will be scantily, if at all, involved.

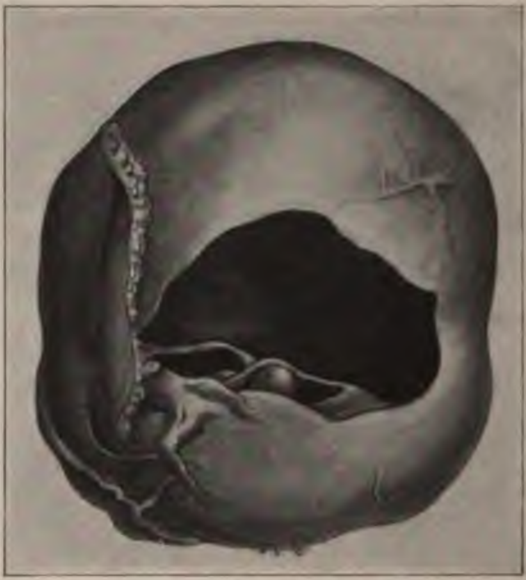
Fig. 506.—Multilocular Cyst.

A great variety in the quality of these vegetations exists; at times only small wart-like growths, from one to two millimeters high, are scattered over the surface, together giving a velvety or grater-like appearance; at others, branching growths of various sizes, up to that of an apple, which may be either broad-based or with a thin pedicle. All the changes are present that are found in the ordinary papillary cyst. The growths appear either as reddish, granulating, cauliflower-like projections, or as sago-sized masses; rarely in the grape-cluster form.

Cyst-contents often present very great contrasts in their color and consistency; they may be found almost colorless, straw-colored, green, purple, or black in color; thin or thick; viscid or gelatinous in consistency. The contents of the various cysts in the same tumor will differ in color and consistency. In some the fluid will be thin, and in others so viscid that it will not flow. The fluid in the smaller cysts is more consistent, and becomes thinner as the cysts increase in size, because of changes in the epithelium.

The specific gravity of the fluid varies from 1002 to 1020, with an average of about 1012. However viscid the fluid, it is found absolutely structureless. Blood-corpuscles, epithelial cells, and crystals of cholesterin are often present. The reaction of the fluid is neutral or alkaline. Upon analysis various forms of albumin, as the metalbumin, paralbumin, and albumin-peptone, are found.

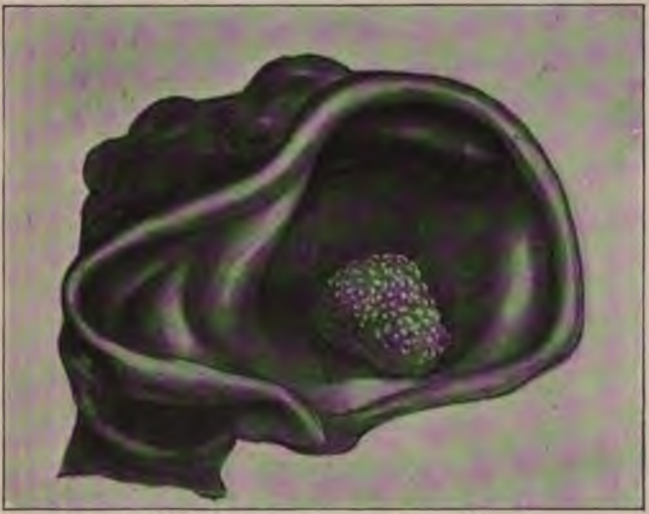

Fig. 507.—Small Papillary Ovarian Cyst.

621. Papillary Proliferous Cysts.—The papillary cysts show a marked proliferation of the connective tissue, which forms itself in tufts upon the inner surface of the tumor, as described in the complication of the glandular growths above. These branching projections may distend the sac to bursting, and these tufts project upon the outside, leading to rapid infection of the general peritoneum. The vegetations spring up luxuriantly over the surface of the ovary, are carried to every part of the peritoneal cavity, and not infrequently, by the aspiration of the diaphragm, are carried to the upper surface of that muscle in the thorax.

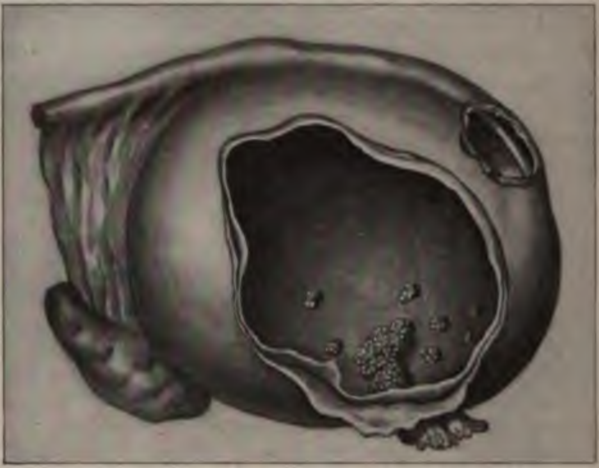

Fig. 508.—Papillary Tufts upon Inner Wall of Cyst.

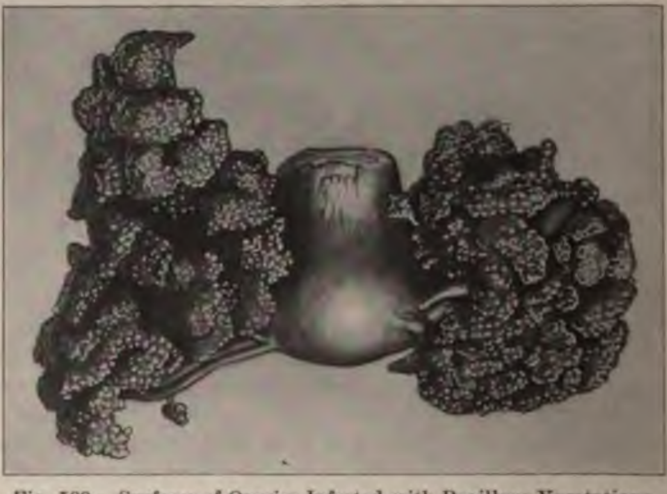

Fig. 509.—Surfaces of Ovaries Infected with Papillary Vegetations.

The contact of this infection with the peritoneum rapidly produces ascites. Similar vegetations may arise spontaneously from the surface of the ovary, and are then known as superficial papillomata. It is probable that these are cases in which a very small cyst has opened and afforded the seed which has infected the external surface. The papillary tumors rarely attain a large size, and are generally bilateral. The dendritic growths project in every direction, are reddish, or pearly white and glistening, often three or four inches long, and have the appearance of stems of coral. The masses have usually undergone a partial calcification, so that they break easily and without bleeding.

622. Dermoid Cysts.—These are growths in which are found skin and mucous membrane, together with all the structures generally associated with such tissues. The tissues most frequently found are hair, teeth, nails, and sebaceous and sweat glands. Other structures, occasionally seen, are the mammæ, horn, bone, unstriped muscle-fiber, and, rarely, tissue resembling brain. Fat or sebaceous material exists in the largest quantity, often at the temperature of the body in a liquid state. Occasionally, it is found in solid balls. Sutton reports finding over three hundred of these in one sac. Hair is frequently present in great abundance, and varies in color, length, and quantity. The hair may be blond, brown, or black, but bears no relation to that of the individual. Teeth are found in about one-half the cysts; they may be loose, fixed, or buried in the wall. Section through the tooth often reveals it situated in a bony alveolus. Beneath the hard

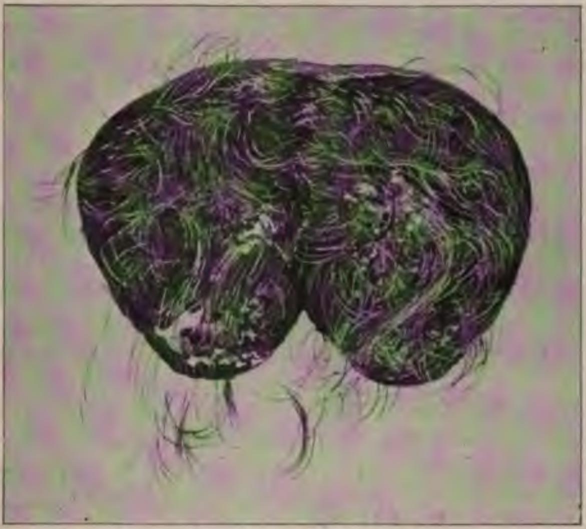

Fig. 510.—Dermoid Ovarian Cyst.

crust of the tooth is found a white or reddish-yellow medullary substance.

We may occasionally find incisors, molars, and premolars in the same bone. The number of teeth is often enormous. Schnabel described a case which had three pieces of bone and one hundred teeth. Plouquet found three hundred teeth. Various bones have been described, as, the jaw-bone, the petrous portion of the temporal bone, ribs, and the pelvic bones. A finger with articulated phalanges, nail, and nail fold, and an entire skeleton have been recognized. In a double dermoid removed from a girl of eleven years I found a well-formed half of the upper jaw, equipped with teeth, alveolar process, and normal mucous membrane.

Dermoids do not always occur alone, but in conjunction with large glandular cysts, the dermoid forming but a small part of the mass. Sometimes the entire cyst will be found filled with sebaceous material, while careful examination, after washing, shows that the skin covers only a small part of the mass.

Teratoma is a more complex form of tumor which is usually classed with the dermoid. It contains an even more varied structure, and resembles more the solid growths than the cystic. It often attains an enormous size, and contains the various structures of the dermoid and cartilage and a large amount of connective tissue. Dermoid growths may appear at any age. They have been found in children at birth and in women of ninety years.

The contents of a dermoid are exceedingly irritating, and every precaution should be practised to prevent the peritoneal cavity from being soiled. I saw a patient in whom an attempted aspiration resulted in drawing out a wisp of hair; the patient at once developed peritonitis, which an early operation failed to prevent becoming fatal.

623. Parovarian Cysts.—The parovarium is situated in the lateral part of the mesosalpinx, and is the remains of the sexual part of the Wolffian body. It resembles in its arrangement a comb, the back of which is directed toward the tube, while the teeth, some twelve to fifteen in number, converge toward the ovary. They are lined with large cylinder epithelium and terminate in blind extremities. The tumors which originate from this structure are almost always cystic and subserous, and consequently have a double wall. The external peritoneal one is easily separable. The pedicle consists of the tube and of the median ovarian and the suspensory ligaments. Torsion of the pedicle, when long, can easily occur. There are two kinds of cysts which arise from the parovarium, of which the most frequent are the small pedunculated, connected with Kobelt's tubules, which rarely become larger than a pea, and are of no clinical significance. The more important are the sessile, which remain between the folds of the broad ligament and burrow into it as they enlarge. These cysts are usually small, though Kummel describes one that weighed forty-two pounds. In the large cysts the tube becomes elongated. The contents of the cyst are clear and limpid, with a specific gravity of 1010 and an alkaline reaction.

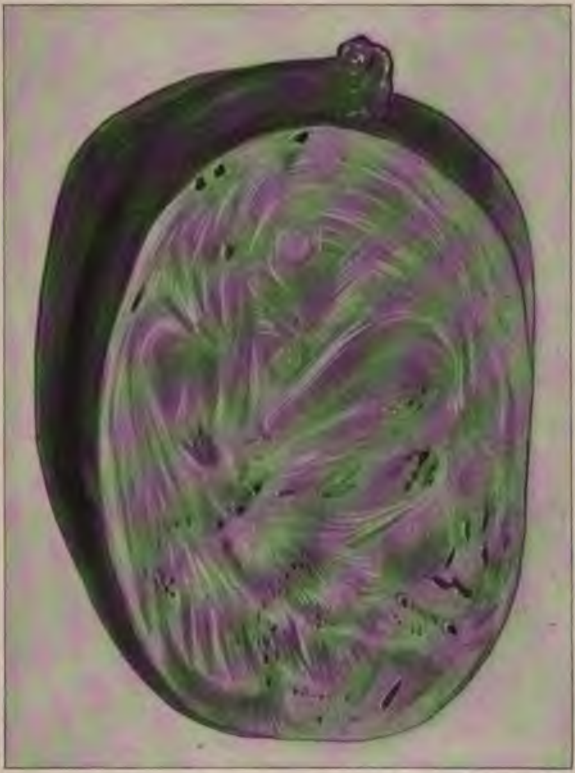

Fig. 511.—Fibromyoma of Ovary.

The parovarian and broad ligament cysts form about eleven per cent. of the abdominal tumors of pelvic origin, and both proliferating and dermoid growths have been found in this situation.

These cysts are distinguished from the ovarian, first, by the ease with which the peritoneum can be stripped off; second, by the ovary being generally found attached to the side of the cyst; third, by the cyst being unilocular; fourth, by the Fallopian tube stretched over the cyst and never communicating with it; and, lastly, by the gradual thickening of the mesosalpinx.

624. Solid Ovarian Tumors.—The solid growths of the ovary comprise five per cent. of the cases that present themselves for operation. These tumors are innocent and malignant, and may become cystic.

625. Fibromyoma, the benign form, is a rare tumor, but is the most common species of solid ovarian tumor. It closely resembles the uterine fibroma, and is frequently accompanied by ascites. Its growth is slow, and the mass retains the normal shape of the ovary. Adhesions are rare; indeed, owing to the peritoneal fluid, the mobility is increased. Occasionally, we have a growth—the fibroma—in which the minute structure consists of wavy bundles of closely packed fibrous tissue intermixed with small round cells. Williams describes one of these that weighed seven pounds seven ounces; Doran, one of seventeen pounds. The myomatous variety is more frequent, and occasionally undergoes calcareous degeneration, when it may be mistaken for an osseous tumor.

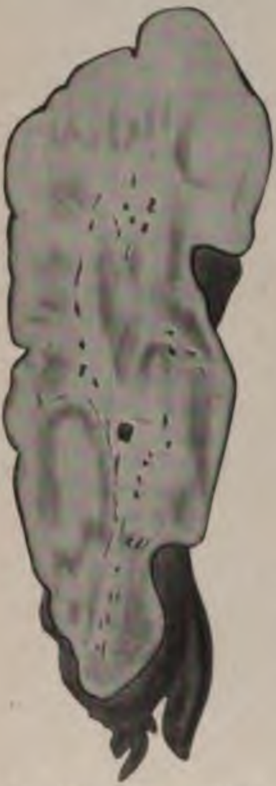

Fig. 512.—Sarcoma of the Ovary.

An apparent hypertrophy, instead of atrophy, of the corpus luteum results in the formation of a growth, occasionally reaching the size of a walnut, which Dr. Mary D. Jones pronounces a *gyroma*, and believes to be closely connected with the endothelium. It probably develops from the corpus luteum when in the cortex, and from the endothelium in the medulla. Leopold describes a peculiar form of ovarian fibroma containing alveolar spaces packed with epithelioid cells. They are produced by dilatation of the lymphatic and capillary channels and the proliferation of their endothelium.

626. Sarcoma of the Ovary.—Sarcoma resembles in form, size, and color the fibroid, excepting that its surface is smoother. Its consistence is softer than the fibroid, though it contains much fibrous tissue, which renders the diagnosis at times difficult to determine. Sarcomata occur as round-cell and spindle-cell growths; when the latter predominate, the tumor is more solid and more strongly resembles the fibroma. The muscle-fibers are longer and the nuclei are more slender and rod-like. The round-cell structure is softer, often presenting macroscopically medullary properties similar to those of medullary cancer, and under the microscope are found large layers and nests of round cells, united with irritation cells, and penetrated by numerous blood-vessels of every caliber.

Spindle and round cells are frequently combined, while myxomatous transformation exists in both kinds, but cartilage and bone formation rarely occurs.

Combinations of sarcoma with adenoma are observed in the walls of the larger cysts, sometimes with sarcomatous degeneration of the stroma. In places, large alveoli are separated by vascular connective tissue, which contains large cells undergoing fatty degeneration and resembling carcinoma. This condition Spiegelberg has called sarcoma carcinomatosum.

627. **Carcinoma of the ovary** is a much more frequent condition than sarcoma. The medullary variety is the most common, and may form a tumor as large as a man's head. The disease occurs primarily, but much more frequently as a secondary manifestation.

628. **Etiology.**—Of the general cause of ovarian tumors nothing is known. Cohnheim's theory of their growth from the retention of embryonic products has never been demonstrated. This theory is improbable as a disposing impetus for certain tumors. It was formerly the accepted theory that the dermoid was derived from the enfolding of the ectoderm in embryonic life, but the diversity of structure found in the dermoid, and especially in the teratoma, precludes the possibility of such origin, and favors the assertion that these tumors arise from the ovum cells which have been subjected to some special irritation. Cohnheim's theory does not regard the fact that any cell of the body can be the point of origin for a new formation.

As to what the irritation is, whether mechanical or chemic, animate or inanimate, or whether it differs in the various kinds of tumors, is as yet unknown. The frequent occurrence in the serous cystadenoma of double-sided growth from the covering epithelium favors the belief in a chemic irritation which has proceeded by way of the uterus and tubes. The theory of the parasitic origin of tumors is as yet unproved, though the analogous course of tumor disease with infection, as demonstrated by the development of various kinds of tumors in the different tissues of the body from metastatic deposits, is of great interest.

The susceptibility to the influence of tumor exciters greatly varies in different individuals; heredity, acquired disposition, age, trauma, scar formation, and inflammation are important factors. Of the influence of heredity little is known, though the occurrence of ovarian cysts in several women of one family is quite frequent. The age has no especial significance as they occur in every period of life. The glandular cysts are more frequent between the thirtieth and fiftieth years. All varieties are less frequent in childhood and old age. Fetal tumors are rare, and generally consist of simple follicular cysts. These cysts increase in frequency as the child approaches puberty, probably then induced by the congestive hyperemia.

Ovarian growths are more frequent in the single than in the married. Scanzoni indicates chlorosis as a predisposing factor, and Fenwick, tuberculosis; but these are difficult to demonstrate.

629. Natural Progress.—Proliferating cysts in the advanced stages grow more rapidly than either the dermoid or solid tumors, unless the latter are malignant. About the early stage of ovarian tumors but little is known, as they are usually well advanced before they come under the observation of the physician. The growth is probably slow. In dermoids and in benign solid tumors the growth throughout is slow. A rapid increase in the size of a growth, noticeable from day to day, is a symptom due to hemorrhage. With the pelvic structures in a normal condition, the cystic ovary drops by its weight into Douglas' pouch, a little to one side of the median line. As it increases it advances in the direction of least resistance, which is upward, and pushes the intestines before it, until it rises out of the pelvis and impinges against the abdominal wall, when it assumes a central position. The pedicle, at first anterior and inferior, is now directly beneath, and often becomes posterior. The tumor lies directly above the uterus, and, resting upon the brim of the pelvis, causes but little inconvenience. Occasionally, the tumor becomes impacted in the pelvis through irregularities in its growth or the formation of extensive adhesions. Sometimes the tumor pushes the broad ligament before it, or, when it develops in the hilum, it will spread out the ligament and become an intraligamentary growth. Once the growth rests upon the pelvis, in its further advance it pushes the intestines upward and laterally. If undisturbed, the enlargement becomes very great, the diaphragm is pushed upward, severe pressure symptoms follow, and the action of the heart and lungs is obstructed. The limbs appear as mere appendages to the enormous abdomen. The pressure affects the circulation, respiration, and digestion, and the renal secretion. There is marked suffering, emaciation, and the characteristic facial expression known as facies ovariana. The presence of ovarian tumors does not interfere with ovulation and menstruation, even though both ovaries are involved, as long as any portion of the ovarian stroma is destroyed. Thornton reports a case of pregnancy with bilateral dermoid disease. In solid tumors amenorrhea is due to the total destruction of the Graafian follicles.

630. Symptoms.—In their early stages ovarian tumors rarely produce any symptoms. Movable tumors generally come first to observation when they rise out of the pelvis. An apple-sized tumor will occasionally, though movable, cause unpleasant symptoms, such as pain in the sacrum, which extends down the leg.

Intraligamentary tumors or those prevented by adhesions from rising produce severe symptoms as soon as they fill the pelvis, especially by obstruction to defecation and micturition. As the tumor increases, the sensations of pressure and unpleasantness are aggravated. Besides the effects given in the description of the progress, the skin becomes stretched, forms striæ, and swelling of the navel and hernia occur. More rarely, from the pressure upon the great vessels, there are edema and varicosities in the legs, sexual apparatus, and skin of the abdomen.

Albuminuria is present, and diminution of the urine from compression of the renal veins is observed, which disappears with the removal of the pressure. Severe compression symptoms from the presence of very large tumors are now rarely seen.

Uterine or vaginal prolapse sometimes complicates the condition, but more frequently ascites and fluid collections follow the rupture of a cyst.

Menstruation is usually unaffected, and sometimes continues regular when subsequent microscopic investigation has failed to show any functionally capable structure. Menstruation disappears comparatively early in those cases in which the follicles perish from the development of sarcoma or carcinoma, and in the papillary cystadenoma, when bilateral. In contrast to fibroid tumor, the menstruation decreases, and a disposition to the menopause is betrayed, not from absent ovulation, but as the result of constitutional conditions. Amenorrhea may exist for several years and menstruation may return after the removal of an ovarian cyst. In intraligamentary growths, especially the papillary cystadenoma, severe menorrhagia occurs from pressure upon the uterine veins.

631. Complications.—Ascites occurs infrequently with cystic growths, unless from rupture, but is very frequent in the solid tumors. The cause is unknown. It can arise from pressure upon the venæ cavæ and large abdominal veins. Edema may involve one or both legs. Distention occurs in the ureter and pelvis of the kidney. The most frequent complication is the formation of adhesions between the surface of the tumor and the omentum, the intestines, the uterus, the bladder, and the abdominal wall. These adhesions arise from inflammation, peritonitis, and sometimes painlessly. They possibly arise from the loss of surface epithelium of the cyst, through friction; fibrinous exudation results, and the formation of adhesions between adjacent surfaces. The adhesions become firm, dense, often thread-like, and between the omentum and the growth may convey vessels of sufficient size to be an important factor in the blood supply. Dermoids are frequently complicated by adhesions. When adhesions occur between the tumor and the bladder or the intestine, the cyst may open into either, and thus discharge its contents. A lock of hair may project from a dermoid into the rectum or the bladder. Adhesions are of importance from the increased difficulty in the removal of the growth. It is frequently exceedingly difficult to distinguish the cyst-wall from the parietal peritoneum.

Torsion of the Pedicle.—A moderate twisting of the pedicle to 90 degrees produces no symptoms; it is only when the torsion is sufficient to influence the circulation, or above 180 degrees, that disturbance is occasioned. A slight twisting always occurs with the elevation of the cyst from the pelvis. The right-sided tumor turns to the left, and the left-sided to the right. The cause of the torsion is unknown. Kustner ascribed it to peristalsis and the changes from the distention of the rectum; Cario, to sudden belly pressure; Mickwitz, to contraction of the transversalis muscle. The influence of pregnancy and changes of position in a relaxed abdomen which contains a tumor with a long pedicle are factors. This torsion may readily arise from manipulation to determine the diagnosis. I saw it occur in a young girl who had been thrown upon the floor by her companion, who sat upon her abdomen. The torsion can occur with very small tumors which are still within the pelvis, in which it most probably arises from the varying distention of the bladder and rectum. The twist may involve but one or two turns of the pedicle, though as many as six twists have been observed. The tube usually shares in the twisting, and torsion of the uterus has infrequently occurred. Torsion of the pedicle can take place in any variety of tumor, though from its greater frequency it is found most often in the cystadenoma. Dermoids and parovarian growths also show a marked tendency to undergo pedicle-torsion. The tendency to torsion of the pedicle is favored by the existence of a long, membranous pedicle, a spheric form of the tumor, and a smooth surface. The twisting is still further favored by pregnancy, labor, and child-bed, through the changing relations of the organs in the abdominal cavity.

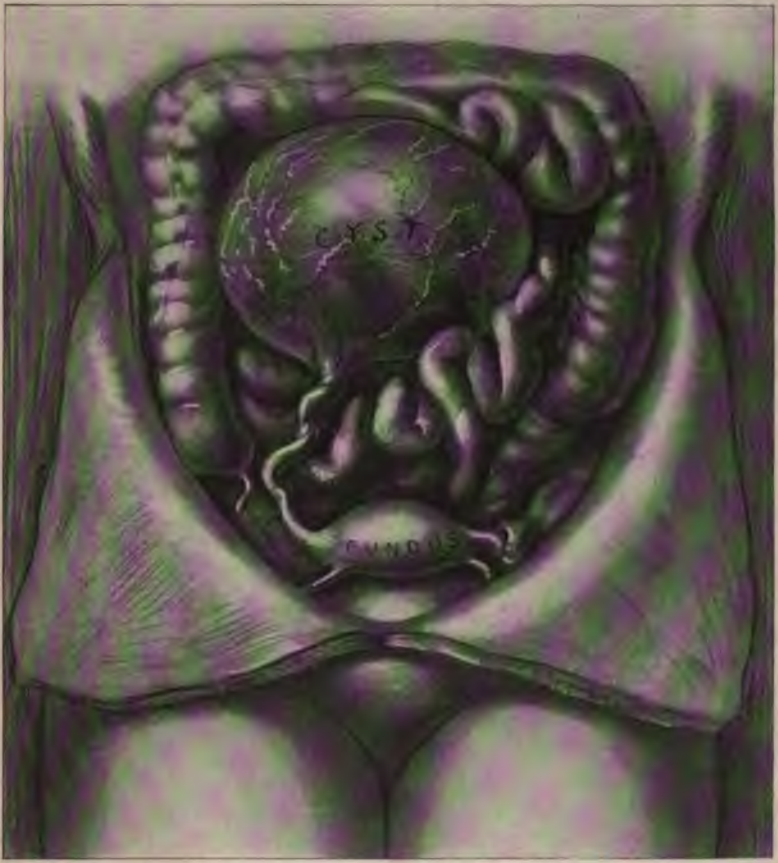

Fig. 513.—Torsion of the Pedicle.

The results of the torsion are dependent upon the rapidity with which it has occurred. The torsion causes obstruction of the vessels, in which the thin-walled veins suffer before the more resistant arteries. There necessarily results an increased engorgement of the blood in the tumor. Solid tumors are completely penetrated by blood, and cystic growths undergo hemorrhagic infiltration of the walls as well as of the contents. The surface presents a black, blue, or dirty brown color, the cyst rapidly increases in volume, and, as a result, easily breaks down. A fatal result can occur from hemorrhage into the abdominal cavity. More frequently hemorrhage is arrested, but the nutrition of the tumor suffers. The covering epithelium is lost, and extensive adhesions occur between the surface of the tumor and the surrounding structures, as the omentum, intestines, and parietal peritoneum.

These adhesions are, at first, very loose, then become organized, and the growth thereby obtains a new source of nutrition, by which it maintains its size or proceeds to new growth. Further twisting leads to obstruction of the arteries, which is followed by necrosis of the growth. Necrosis is followed by shrinking of the tumor from the absorption of its fatty constituents, though it rarely disappears. It can become calcified. Peritonitis, with the formation of extensive ascites, almost always results. The peritonitis arises independent of micro-organisms, and is due to the irritation from the presence of a foreign body or to the chemic products of the tumor. An infection can occur through the tube or from kinking of the intestine. Sometimes suppuration of the tumor and pyemia ensue. A slight torsion can bring about edema instead of hemorrhage, and ascites instead of peritonitis. The pedicle may be found attenuated or its thickness may be doubled. The dermoid growths are sometimes found free in the abdominal cavity or in pedicle-like adhesion with other structures. A dermoid under my observation was held in front of the uterus by adhesions above to the omentum, and below to the peritoneum; the tube and upper part of the broad ligament upon the left side had entirely disappeared. The separation was evidently old, for the wall of the growth had undergone calcareous degeneration. Ileus has resulted from the adhesion of a loop of intestine to the tumor or to its pedicle.

Symptoms.—Not infrequently there are no symptoms of torsion. Such cases are usually recent or the torsion has been slight. It may be suspected when the patient is taken with severe pain in the belly, associated with meteorism, and sensibility to pressure, acceleration of the pulse, sometimes also singultus, vomiting, and fever. In torsion of high degree indications of intra-abdominal bleeding appear, with not infrequently marked collapse. In the chronic condition the pain and unfavorable symptoms are more gradual, though many patients are bedridden and show a distinct loss of strength, occasioned by the absorption of the altered constituents of the tumors producing a condition resembling cachexia.

Inflammation and Suppuration of the Cyst.—Cysts can undergo inflammatory and suppurative changes, though much less frequently than formerly, as puncture of the cyst is not so often practised. In some tumors, the contents of which resemble pus, the microscope demonstrates that the material consists of epithelium and cell detritus, but not of leukocytes. The inflammation is mostly communicated by the tube and intestine; the latter especially when adhesions have taken place between the intestine and the sac. The opportunities for infection are increased by parturition and the puerperium, as a result of the possible trauma occasioned during the labor. Dermoid tumors are inclined to suppuration, formerly supposed to be due to the peculiar pus-exciting character of their contents, but much more probably the result of injury which the tumor has undergone during its long retention within the body. We have already seen that the dermoid was prone to torsion of its pedicle, and its contents are an excellent culture-medium for the propagation of bacteria.

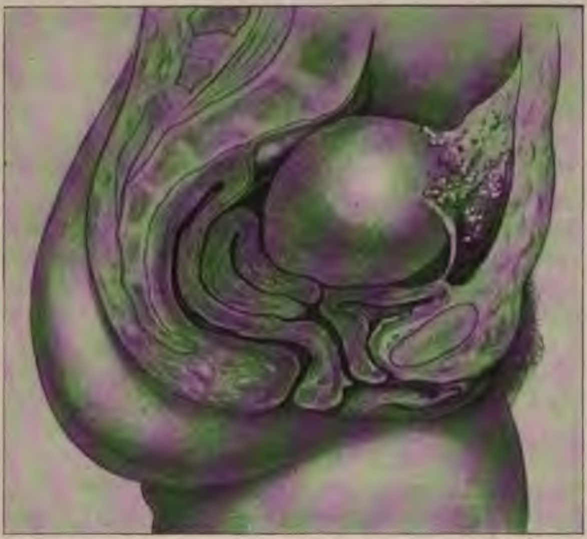

Fig. 514.—Dermoid Which Had Lost Its Original Relations and Was Nourished by Adhesions from the Omentum.

Symptoms.—The occurrence of inflammation and suppuration is characterized by fever and typhoid phenomena, which vary in intensity according to the nature of the infection. The patient does not experience much pain unless peritonitis is associated.

The pulse becomes very rapid and emaciation is progressive. Adhesions to the suppurating tumor occur, and the pus makes its exit, as in ovarian abscess, into the bladder, the rectum, or the vagina. It is but rarely that the pus is completely evacuated and that spontaneous recovery results. Death usually follows from pyemia. A rupture into the peritoneal cavity is quickly followed by fatal peritonitis. The evacuation of such a tumor through the bladder produces the greatest distress, as hair, teeth, and pieces of bone are discharged, sloughs become impacted in the urethra and induce cystitis, and there is retention of urine and marked vesical tenesmus. Fragments which remain in the bladder are coated over with urine salts, and become the nuclei of calculi.

Rupture of Cystic Tumors.—Rupture of a cyst may occur suddenly, the result of a fall or blow, or can gradually result from changes in the cyst-wall. It occasionally follows from internal pressure caused by the growth of the tumor. The latter accident produces no symptoms, and it is only exceptionally that hemorrhage complicates spontaneous rupture. In papillary growths the pressure of the vegetations causes thinning of the cyst wall, and, finally, rupture; or the growths project through the wall of the cyst, to extend over its external surface. Rupture of a cyst can occur into the surrounding viscera, but more frequently into the peritoneal cavity. In very thin-walled cysts this rupture occurs easily. Manipulation to determine the diagnosis, changing the position in bed, the act of coition, vomiting, may produce it, and frequently it occurs without assignable cause. The influence of the accident will naturally depend upon the character of the cyst-contents. Often, in the unilocular cysts, rupture into the peritoneal cavity is attended with no untoward symptoms, beyond an excessive flow of pale urine. The patient will often pass several gallons of urine in twenty-four hours, and the abdomen, which was large, will become flattened, flabby, and readily permit the residual sac to be recognized by palpation. In single and parovarian cysts recovery can occasionally follow the rupture. Generally, the opening is closed by adhesions, and the fluid reaccumulates. In some cases the accident is followed by high temperature, rapid pulse, vomiting, pressure at stool, and diarrhea, which indicate the absorption of the contents, and by a kind of auto-intoxication. In multilocular and dermoid growths the rupture into the peritoneal cavity is ordinarily followed by infection, a rapidly developing peritonitis, and, finally, death. Such a termination is probable not only in dermoid, but also in those cysts containing colloid material and pus. In the papillary cysts rupture results in the infection of the peritoneum, the formation of ascites, and the development of vegetations over the entire cavity. Sometimes an artery is torn in the rupture, and marked hemorrhage, with profound anemia, follows. Profound collapse has been noted.

The occurrence of rupture is recognized by the disappearance of, or diminution in the size of, the tumor, the recognition of free fluid in the peritoneal cavity, peritonitis, collapse, diarrhea, and diuresis. The accident can be mistaken for torsion. Rupture into the intestine is evident from the character of the discharges, when a profuse watery discharge follows. External rupture is usually easily recognized. When the discharge is pus or ichorous material alone, it is often difficult to determine whether it is from a cyst or an abscess in the walls.

Complication of Ovarian Tumor with Pregnancy.—The existence of ovarian growths does not preclude the occurrence of pregnancy, though their coexistence is comparatively rare. It is more frequent in the one-sided, though it occurs sufficiently often in double-sided disease to demonstrate its possibility as long as any functionating portion of ovary remains. The complication can occur with any variety of ovarian tumor, though it is more likely to complicate the slow-growing forms—the dermoid and the pseudomucin—than the others. Numerous cases are recorded in which the patient carrying an ovarian tumor has successfully run the gantlet of several pregnancies. The existence of such a tumor, however, does increase the distressing symptoms and the danger of pregnancy. There is not the same tendency to rapid growth of the cyst during pregnancy as exists when a fibroid growth is complicated by the same condition. The assertion that the occurrence of pregnancy favors malignant degeneration in the cyst is unproved. The occurrence of carcinoma in a cyst during pregnancy is no proof that it was not previously there, or that it would not have occurred had pregnancy never existed. The changing relations of pregnancy, labor, and childbed undoubtedly do favor the occurrence of torsion of the pedicle, and the delivery of the fetus, whether naturally or by the use of instruments, not infrequently crushes or bruises the cyst so that it ruptures or undergoes inflammation and suppuration. While the varying relations of pregnancy, labor, and the puerperium exert an injurious influence upon the progress of the tumor, it can, on the contrary, greatly disturb these processes. The diminished space in the abdomen affords less room for the normal development and increases the danger of abortion and premature delivery. Abortion has been frequently reported as a result of the retroflexion of the uterus produced by the tumor. In labor a large tumor can materially interfere with the normal forces of delivery by decreasing the activity of the contractions and by altering the situation of the uterus. Much more worthy of consideration is the situation of a tumor of small size in the pelvis, below the uterus, where it acts as an obstruction to the progress of the child's head. If these are not flattened or pulled out of the pelvis, the head of the child can not enter, and, unless otherwise alleviated, labor can terminate in rupture of the uterus,

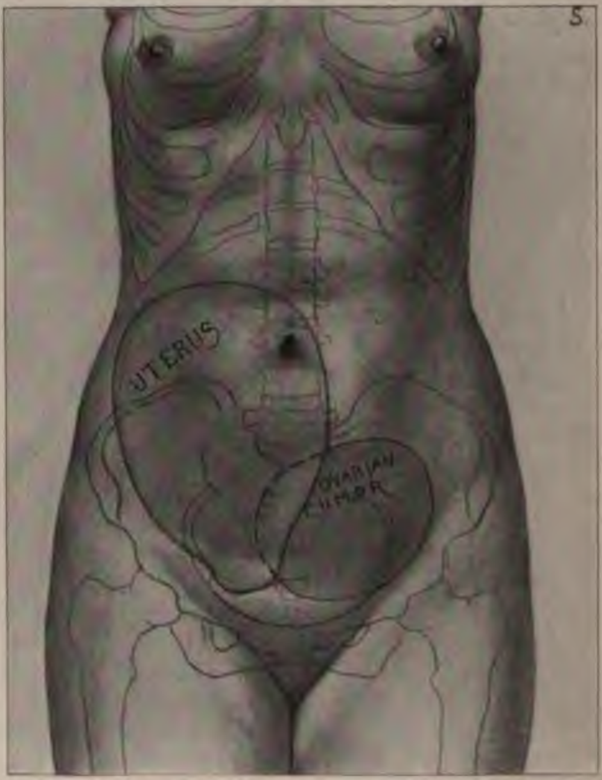

Fig. 515.—An Ovarian Cyst beneath a Pregnant Uterus.

tearing of the vagina, or bursting of the cyst. Such complications are necessarily attended with danger. The puerperium can be complicated by gangrenous processes in the tumor and its pedicle, following the injury of labor.

The coexistence of the ovarian tumor with pregnancy, when large, causes increased difficulty in respiration, through pressure upon the diaphragm, and can cause danger to life by the pressure and the tendency to albuminuria and edema. The tendency to torsion of the pedicle, to rupture of the sac, and to subsequent inflammation naturally clouds the prognosis.

When the cyst is situated in advance of the uterus, an effort should be made to push it up, and, upon failure, we may be left to the choice between delivery of the growth through a vaginal incision or its puncture through that canal and its removal after delivery. In the early months of the pregnancy operative interference for the removal of the tumor has but little influence upon the progress of the pregnancy, and should be considered whenever the size and situation of the growth threaten the successful termination of the pregnancy.

632. Degenerative Changes in the Cyst-walls.—The cyst-walls can undergo the following degenerative processes:

First, *calcification*, which most frequently occurs in the inner layer of the main cyst-wall in the form of small granules or plates of lime, or the formation of psammous bodies similar to those seen in the papillary cysts. The calcification is increased with the impairment of nutrition following gradual torsion. In a case of dermoid which came under my observation the deposit was so extensive that the tumor resembled a calcareous fibroid.

Second, *fatty degeneration* occurs in the papillary cells in the connective tissue and walls of the cyst. This process is enhanced by impairment of nutrition. The change in the septa of cysts occurs from the pressure of their contents, and ends in their partial or complete destruction. The presence of a large amount of fat in the walls is an evidence of slow growth.

Third, *atheromatous changes*, which generally occur in the inner layer of the wall.

Fourth, *changes due to infarctions*, which are indicated by whitish, opaque bodies found in the septa and surrounded by a red zone.

633. Diagnosis.—In the diagnosis of ovarian tumors the physical signs are ascertained by the employment of inspection, palpation, percussion, and auscultation. The information derived by these procedures has been given. (Sections 91 to 95.) The difficulty in the diagnosis will depend upon the size, situation, relation, and complications of the tumor. The questions to be considered are:

First, Have we, in the case before us, a tumor under consideration?

Second, The existence of a tumor recognized, is it an ovarian growth?

Third, An ovarian tumor admitted, we ascertain its relations to the surrounding parts and the existence or absence of a pedicle or of adhesions.

Fourth, the variety of the ovarian tumor.

First, Is the distention of the abdomen an intra-abdominal tumor? This, at first thought, may seem an unnecessary question, but the frequency with which various enlargements of the abdomen are mistaken for such growths, and the occasional difficulty in arriving at a certain determination, fully justify the careful consideration of the subject. For convenience of study we divide the ovarian growths into small, or those situated within the pelvis, and large, when they are resting upon the pelvic brim.

The abdominal enlargements, other than tumors, with which an ovarian tumor can be confused are obesity, desmoid tumor of the abdominal walls, ventral hernia, tympanites, fecal accumulation, distended bladder, ascites, and localized peritoneal effusion.

Obesity.—A large, pendulous abdomen, from the accumulation of fat within its walls or in the omentum, is sometimes mistaken for an ovarian tumor. The history of its development and the distribution of adipose to other parts of the body, contrasted with the general emaciation of an ovarian cyst, should assist in determining the diagnosis. The thickness of the fat accumulation can be pretty accurately estimated by grasping a fold of the skin and subcutaneous tissue between the thumb and fingers.

Desmoid Tumor of the Abdominal Walls.—This growth, which is infrequent, develops in the muscle-wall, and partakes of the nature of a fibroid. Generally, from its weight it forms a dependent tumor, which sometimes extends to the knees. It is quite movable with the abdominal wall, and is superficial and very hard. Its situation in the wall, covered by the skin and superficial fascia, and the determination by vaginal or rectal examination of the absence of any connection with the pelvic viscera, determine its character.

Ventral Hernia.—Twice in diastasis of the recti muscles with a large protrusion of the viscera have I been called a long distance to operate for supposed ovarian cyst. Palpation of the intestinal coils, the resonance upon percussion, and the observation of the peristalsis, readily seen through the thin covering of skin and peritoneum, should have excluded the diagnosis of a cyst.

Tympanites.—A localized tympanites or phantom tumor, a condition similar to pseudocyesis, is sometimes mistaken for an ovarian cyst. The loud volume of resonance obtained by percussion should be considered as contraindicating the probability of the existence of a cyst. It is true that in rare instances a communication of a cyst with the bowel will permit it to become resonant. A similar condition will arise from decomposition of cyst-contents, by which gas forms in the cavity. Even in these cases a sense of fluctuation can be secured, which is absent in the phantom tumor. The latter tumor will entirely disappear while the patient is under an anesthetic, to return as soon as the patient recovers.

Fecal Accumulation.—An accumulation of feces is sometimes called a fecal tumor. It forms in the colon, and when in the transverse portion of the gut, may descend and lie directly over the pelvis. These accumulations are occasionally quite extensive, but are recognizable by their length, by the peculiar sensation under palpation, and by the possibility of leaving an imprint upon pressure, but most of all by the fact that they disappear under the administration of purgatives and enemata.

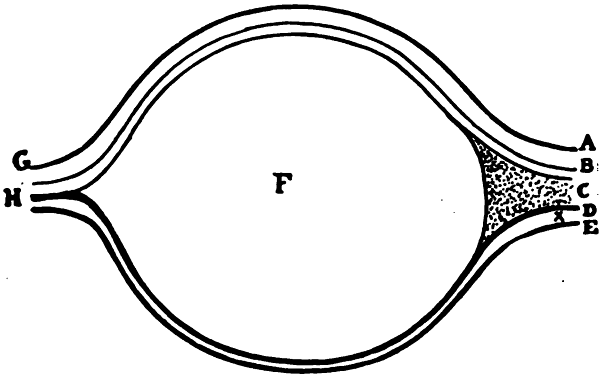

Fig. 516.—Desmoid Tumor of Abdominal Wall.

A. Skin. B. Superficial fascia. C. Abdominal muscles. D. Transversalis fascia. E. Peritoneum. F. Tumor. G. Median line. H. Anterior sheath of the rectus muscle. X. Subperitoneal cellular tissue.

Distended Bladder.—A distended bladder forms a tumor in the lower part of the abdomen which fluctuates and may very readily be mistaken for an ovarian cyst. This suspicion is apparently confirmed by the information that the patient is constantly passing urine. The fixed position, and the bulging of the anterior wall of the vagina, should be sufficient to indicate the use of a catheter, when the tumor will disappear. It should be the invariable rule to empty the bowel and bladder preliminary to the examination of an abdominal tumor.

In pregnancy, fibroid tumor, or even a simple ovarian tumor impacted in the pelvis, the urethra may be so distorted and compressed as to render necessary the use of a soft male catheter.

Ascites.—In uncomplicated ovarian cysts the differential diagnosis from ascites is not difficult to make. The cysts have, in common with ascites, enlargement of the abdomen, fluctuation, and the symptoms arising from pressure against the diaphragm. Not infrequently both conditions will be characterized by progressive loss of strength and flesh and by more or less edema of other parts of the body, but there is a marked difference in the

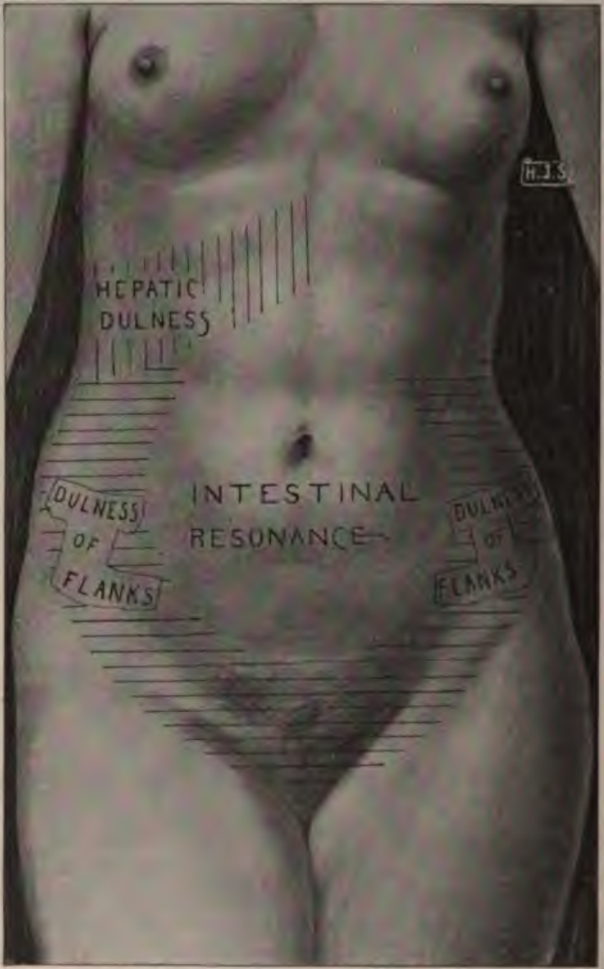

Fig. 517.—Relative Zones of Dullness and Resonance in Ascites.

manifestation of these symptoms when we come to analyze them. The enlarged abdomen in ascites is more or less flattened and its widest diameter is transverse, while the ovarian cyst is most

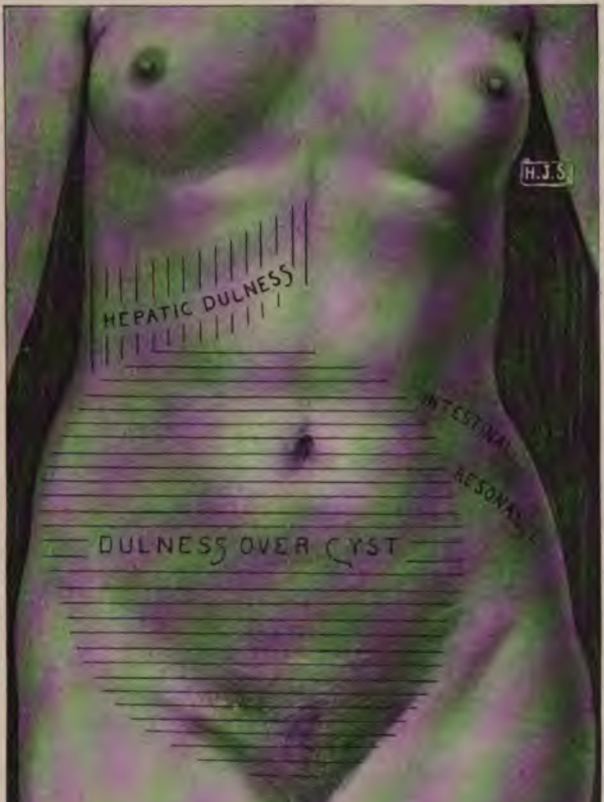

Fig. 518.—Relative Zones of Dullness and Resonance in Ovarian Cyst.

prominent in the vertical diameter and is narrow from side to side. Fluctuation is very distinct over the abdomen in ascites and in unilocular cysts, but the wave of fluctuation will be found to extend nearer to the vertebræ in the former. In the well-filled cyst the projection of the vertebræ prevents the approach of the fluid to the lumbar regions. In multilocular cysts the wave of fluctuation is more broken, and frequently is only recognized as a sensation of elasticity. The loss of strength is often more marked in ascites, while the appearance of emaciation is greater in the cyst. In renal and cardiac dropsy there is much greater disposition to anasarca. In a very advanced and large ovarian tumor the pressure may induce considerable dropsy of the extremities, but the abdominal distention is in much greater proportion.

On palpation the ovarian tumor presents greater resistance and can frequently be outlined and its surfaces distinctly determined. The abdominal surface can be moved over the tumor and the upper margin is easily recognized. The existence of adhesions or the presence of a large quantity of fluid may obscure the conditions. Percussion affords the most valuable information. In ascites there is a distinct zone of resonance over the center of the abdomen, or the point of greatest prominence, while the more dependent portions are dull. The zone of resonance changes with the position of the patient. In ovarian cyst, on the contrary, there is dullness upon percussion over the whole surface of the tumor, and resonance only after we have passed beyond its limits, which is unchanged by position. As the tumor, in its growth, presses the intestines upward and to the opposite side before it, the resonance will generally be discovered above, and on the side opposite to that upon which the tumor has originated. Occasionally, in a distended colon, resonance may be secured over it in ascites. When the abdomen is very greatly distended, or when inflammatory conditions bind down the intestines, resonance will be absent upon superficial percussion, but may be easily determined when more pressure is used. The pressure displaces the intervening layer of fluid and permits resonance to be obtained. In tubercular peritonitis and in hepatic dropsy, when the mesentery has undergone contraction and the peritoneum is very much thickened, the diagnosis can be so obscure as to require an abdominal incision to determine it.

Ascites may complicate an ovarian cyst, when, by displacement of a layer of fluid, the hand will come in contact with the cyst. The amount of resistance will afford information as to whether the tumor is solid or cystic. The complication of ascites can be regarded as an evidence of malignancy or of some degenerative process. The greater the amount of ascites, the more probable the malignancy. I have, however, seen very large ascitic accumulations from necrosis of a cyst after torsion of its pedicle. The uterus is freely movable in ascites, while in ovarian cyst it is but slightly movable, and displaced either downward and backward or upward and forward. In ascites arising from ruptured papillary cysts a dense, thickened mass is recognized upon each side of the uterus, which should cause a suspicion of its true character.

Localized Peritoneal Effusion.—Localized collections within the abdominal cavity offer great difficulties in determining the diagnosis. Such accumulations are generally the result of tubercular disease, and the history of the development of the disorder, the general condition of the patient, and careful investigation of the abdomen will afford an intimation as to its character. It was my misfortune recently to mistake a collection within the lesser peritoneal cavity for an ovarian cyst. The abdomen presented the characteristic appearance of a large ovarian cyst. A vaginal examination would have revealed the uterus and ovaries below a collection which did not dip into the pelvis, but, unfortunately, no such investigation was made. The diagnosis of ovarian growth was accepted upon the external appearance. Upon abdominal incision the general peritoneal cavity was free from fluid. An apparent cyst upon the intestines was spread out, projected into the incision, from which over three gallons of straw-colored fluid were withdrawn, and investigation demonstrated the character of the cavity.

Second, Is the tumor under our observation an ovarian tumor? The physical signs vary with the size and situation of the tumor. In the early stage the tumor is entirely within the pelvis, and its position varies. When it reaches the size of a hen's egg, the tumor falls into the pelvis, where it remains until it becomes too large to be longer accommodated in that situation. Its relation to the corresponding side of the uterus permits its character to be determined by conjoined manipulation. When the growth has been complicated by peritonitis, the diagnosis may be difficult. Small tumors usually feel firm because they are not sufficiently large to afford fluctuation, or even elasticity. The latter is of importance, and is generally absent in proliferating cystomata, in dermoids, and even in small single cysts. When we are unable to separate the tumor from the uterus, and consequently to determine the existence of a pedicle, the latter can be ascertained by Hegar's method. This, while the patient lies upon her back, consists in seizing the uterus with a vulsellum, and dragging it well down, while two fingers in the rectum follow its borders to determine its relation to the growth, or the hand over the abdomen can depress the fundus and thus recognize its relation. When a tumor is not large, it can usually be outlined by a hand over the abdomen and a finger in the rectum. The greatest difficulty is experienced when the tumor is complicated by inflammatory conditions, is fixed, and often incarcerated. Tumors which have originated in the broad ligament, and which lie in close relation to the uterus, are usually less spheric and circumscribed, and are less movable from their first inception. Fibroid tumors of the uterus and inflammatory growths of the tubes are likely to be confused with small ovarian cysts. These growths are pyosalpinx, hydrosalpinx, and hematosalpinx. The acute history, marked tenderness, evidence of inflammatory exudation, thickening, and matting together of the pelvic tissues, associated with marked pain, should distinguish the pyosalpinx. In hydrosalpinx the tumor can be movable, and may give a sensation of elasticity or fluctuation, but is oblong or gourd-like, rather than spheric. It is frequently closely adherent to the uterus, and affords a history of previous inflammation. A hematosalpinx is at first soft, then becomes hard from the coagulation of the blood. They are usually situated to one side of the pelvis and posterior to the uterus. Fibroid growths are firmer, and are closely attached to the uterus.

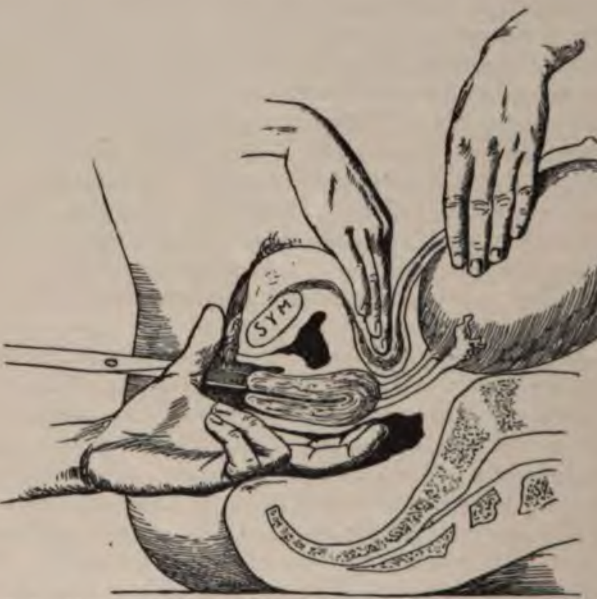

Fig. 519.—Hegar's Method of Determining Relation of Tumor to the Uterus.

Large or Abdominal Growths.—A large ovarian cyst distends the abdomen, particularly at its lower part, rises abruptly from the pubes, and is sharply defined and generally symmetrically developed. Its outline, extent, and size are readily determined by palpation. In a large single cyst the surface will be smooth and regular, while in the multilocular cysts projections and irregularities are often found. If it is made up of a large number of small cysts, it will be more resistant, although it will still present a sensation of elasticity. These growths are confounded with pregnancy, hydramnios, extra-uterine gestation, uterine myomata, retroperitoneal growths, and the tumors of the various viscera of the abdominal cavity.

Pregnancy.—The enlargement of the abdomen is more rapid than in ovarian tumor. It is generally associated with suppression of the menses and with the presence of such sympathetic nervous phenomena as nausea, vomiting, disturbed appetite, and, in the more advanced stage, a florid, healthy appearance of the patient. Suppression of the menses is not a constant symptom of pregnancy, for there are some women who continue to menstruate during the entire pregnancy, nor is amenorrhea always absent in ovarian growths. Error is more likely to occur in the unmarried, during the early stage of pregnancy. The physician should refrain from making a diagnosis until he has had an opportunity to make a careful examination, and then should hesitate to express an opinion when there is the least reason for doubt. An examination a few weeks later will dispel the uncertainty. There is an absence of fluctuation in pregnancy; but it is also absent in cysts with thick, viscid contents, or in the areolar and glandular varieties, which are made up of a large number of small cysts. As pregnancy advances the fetal movements, heart-sounds, and parts of the fetus are recognizable. The heart-sounds are pathognomonic of pregnancy, but are not always heard, owing to the position of the fetus, the large quantity of fluid, or fetal death. The conjoined manipulation will afford information as to the relation of the enlargement to the uterus. Gestation in one horn of a bicornate uterus can make the diagnosis difficult, but a careful bimanual exploration will demonstrate the association of the enlargement with the uterus, and the small undeveloped cornu in association with the enlargement. Under no circumstances should the size of the uterus be determined with a probe when there is the least suspicion of pregnancy.

Hydramnios.—Hydramnios is a pathologic form of pregnancy in which there is a more or less large collection of amniotic fluid in the uterine cavity. Cases in which the collection exceeds two quarts have been mistaken for ovarian cysts. In large collections the abdominal cavity becomes greatly distended; its surface is smooth, white, and glistening, and fluctuation is very distinct. The patient suffers all the discomfort characteristic of a large cyst. The history will prove of value in determining the diagnosis. Hydramnios generally occurs suddenly, and makes its appearance about the sixth or seventh month of a pregnancy which has previously run a normal course. Such symptoms could arise only from an ovarian cyst which had undergone some marked change in its nutrition, but this diagnosis would be excluded by the previous indications of pregnancy. The physical examination of such a patient will disclose an enlarged uterus, the cervix of which is frequently obliterated, os open, and covered with a dense membrane, through which, by manipulation, we are often able to distinguish parts of the fetus or obtain ballottement. Rupture of the membrane is followed by the discharge of a large quantity of water and the evacuation of the uterine contents. It should not be overlooked that the existence of an ovarian cyst does not preclude the occurrence of pregnancy, and the presence of the latter, by the increased flow of blood to the pelvis, may facilitate the growth of the cyst. As we have already seen, the rapidity of the growth may be so great as to require early interference in order to save the life of the patient. Careful examination will usually disclose an enlarged uterus either in front of or behind the cyst.

Extra-uterine Pregnancy.—An ectopic gestation which has attained a size sufficient to permit it to be confused with an ovarian cyst will have presented the symptoms of early pregnancy, possibly indications of rupture of the sac and internal hemorrhage. Later, the tumor may be found to one side of or behind the uterus, and so closely adherent to it as to render the differentiation from it exceedingly difficult. In advanced stages the fetal movements and the heart-sounds may be heard. Vaginal palpation will disclose the fetal parts covered with a thin wall. After the death of the fetus other changes occur which render the diagnosis still more difficult. The fetus shrinks, becomes macerated, and the decomposition produces an accumulation of gas, which, with the distinct fluctuation, makes the condition doubly obscure. A careful analysis of the subjective symptoms, associated with a thorough examination, will generally permit its recognition.

Uterine Myomata.—Generally, the slow growth, the resistance of the tumor, and the usual presence of multiple growths, their irregular contour, and their demonstrable relation to the uterus, should afford confirmation of the diagnosis. A tumor which has but recently come under the observation of the patient, and which has, through degenerative or obstructive processes, taken upon itself rapid growth, may afford considerable difficulty in ascertaining its true character. The difficulty becomes very great in edematous fibroids and in fibrocystic tumors. It would seem that the demonstration of the continuation of the mass with the cervix would be sufficient to demonstrate the uterine origin. Double ovarian cysts, particularly when the pedicle is short or absent, may so drag upon the fundus uteri as to make it apparent that the growths are a part of the uterus. The relation of the uterus to the tumor is best determined by grasping the cervix with a vulsellum, which is held by an assistant; a second assistant draws up the tumor through the abdominal walls, while the principal, with one or two fingers in the rectum, and the hand over the abdomen, seeks the pedicle and ascertains its relation to the uterus. This procedure, even in double growths, will permit the fundus to be recognized and the nonuterine character of the growths to become known. In the early history of abdominal work not infrequently the abdomen was opened for an ovariotomy and a uterine fibroid was discovered. Indeed, the earlier removals of the uterus were cases of mistaken diagnosis. Uterine myomata may complicate the presence of an ovarian cyst, and the consequent distention of the abdomen from the presence of two large tumors may render earlier interference desirable. The ovarian cyst may be situated in front of the myomatous uterus, and the growth may be unsuspected until discovered during the progress of an operation.

Retroperitoneal Tumors.—Retroperitoneal tumors are very rare. They may originate from the tissue in the pelvis or from that of the subperitoneal portion of the abdomen. The more fixed position of the mass, the recognition of resonance over the tumor, and, particularly, the ability to demonstrate, through rectal palpation, the presence of the rectum in front of the tumor will assist in the diagnosis.

Other Abnormal Collections and Growths.—The uterus can present morbid collections, such as physometra, hydrometra, and hematometra. Physometra is a collection of gases within the uterus, the product of decomposition, and is a rare condition. Hydrometra, a collection of watery fluid within the uterus, mostly occurs in women of advanced years, and is caused by retention of the secretions after obliteration of the canal. Hematometra is a collection of blood in the uterus,—as the retention of the menstrual discharges from occlusion of the cervix or vagina,—and it mostly occurs near puberty. Inspection and bimanual palpation are sufficient to disclose the cause. The situation of renal and hepatic cysts is sufficient to release them from the suspicion of an ovarian origin.

Third, the relation of the tumor to the surrounding parts, the character of the pedicle, and the presence of adhesions :

Adhesions.—The mobility of the tumor is dependent upon the length of the pedicle and upon the absence of adhesions. A tumor which can be pushed up without much dragging upon the uterus, displaced from side to side, and the abdominal walls recognized as sliding over it, is reasonably free from adhesions, and has a long pedicle. A tumor which is situated upon one side of the pelvis, and pushes the uterus to the opposite side, and which is quite immovable, or drags upon the uterus as it is moved, is, without doubt, an intraligamentary cyst. Rapid enlargement, tenderness of the abdomen, and a sensation of crepitus as the abdominal wall is being moved over the tumor indicate recent and extensive adhesions, the result of peritonitis. Limited adhesions with omentum, intestines, and abdominal wall can not be excluded. In very large cysts it is frequently difficult to diagnose the presence of adhesions. Information can often be secured by observing the respirations. In deep inspiration we can feel and see the upper pole of the tumor pushed down, unless it is fixed. The ability to drag the uterus down will assure its freedom. If the fundus uteri remains high when the bladder is empty, it is adherent. The history is valuable, as adhesions occur in torsion of the pedicle, in inflammatory changes, and from traumatism.

Torsion of the pedicle is recognized by the complication of an ovarian tumor with sudden and severe peritoneal symptoms. These are severe pain in the belly, meteorism, vomiting, elevated temperature, rapid growth of the tumor, and tenseness of its surface, which indicate that the torsion has been followed by intracystic hemorrhage or increased exudation.

When the patient is seen long after the torsion, the tumor is everywhere adherent, and the patient may show distinct evidences of marasmus. Sudden collapse, followed by symptoms of internal hemorrhage and by peritoneal irritation, indicate the occurrence of an internal hemorrhage. In the acute stages of torsion it is often difficult to arrive at a differential diagnosis from rupture of an ovarian cyst, peritonitis, perforation of the stomach or intestine, renal or gall-stone colic, ileus, and rupture of an ectopic gestation. An attentive consideration of the history and progress of the disorder will lead to a direct conclusion. Inflammation of a tumor is determined by the accompanying symptoms. The tumor is very sensitive, and presents a spontaneously localized, sometimes radiating, pain. The tumor may suddenly enlarge, or the suppuration may lead to the formation of gas and the development of a tympanitic resonance. Perforation of a suppurative tumor into the bladder or intestine is recognized by tenesmus and irritation of the bladder or by diarrhea and intestinal colic. Perforation is certain if portions of the tumor or its contents are found in the discharges. Rupture of a cyst is determined by the associated phenomena. Sudden oppression, suffocation, nausea, sometimes vomiting, diarrhea, acceleration of the pulse, and moderate elevation of temperature indicate the entrance of fluid into the peritoneal cavity. This is rendered more probable by strong diuresis and a perceptible decrease in the size of the tumor, with the presence of free fluid in the peritoneal cavity. The distinct tumor limits are not found, and there is no alteration of resonance with change of position.

Fourth, the variety of the ovarian tumor. The glandular proliferating cyst is the most frequent form and attains the largest size. These tumors are mostly multilocular, and consequently present a less marked wave of fluctuation upon palpation. Fluctuation is an indication of the cystic character of the tumor, and is very distinct in the unilocular and large-chambered varieties. Instead of fluctuation we often find a kind of elasticity, which can be produced by edematous solid growths, and in large cysts the contents of which are made up of colloid or very thick, viscid material. In some cysts, instead of fluctuation, only a kind of vibration is determined. In fluctuating or tough elastic tumors which are nodular we will probably find a cystadenoma. A large fluctuating tumor is not necessarily a unilocular cyst, because it may contain within it numerous small cysts.

Generally, a small cyst which presents no symptoms is not a cystadenoma, but may be a dermoid, a parovarian, or, more probable than either, a simple retention cyst of the ovary or a simple serous cyst. Dermoid tumors are recognized by their irregular consistency—in some places soft, in others hard. A doughy feel has been ascribed to them, but this is rare, as the fatty material at the body-temperature is fluid, and it is only in the presence of a large amount of hair that the doughy sensation can be elicited. The determination that the tumor had been in existence for ten or more years would justify the suspicion of a probable dermoid. Olshausen says that parovarian growths are mostly determined by their moderate size, slow growth, thin and relaxed walls, the translucent fluid contents, and the very distinct fluctuation. Parovarian tumors, as a rule, are spheric, though from their relaxed condition they may assume other forms, especially when pressed into the pelvis. Large cysts are generally multilocular. The presence of double intraligamentary growths, as well as of ascites with small tumor formation, is a presumption, but not a positive indication, of papillary growths, as the conjunction of symptoms is found in all tumors. Superficial papillomata feel firm, nodular, and are often diffusely extended in the pelvis. In a rapidly developing ascites, in which renal, cardiac, and hepatic causes can be excluded, the presence of bilateral resistance in the pelvis should awaken a suspicion of ruptured papillary ovarian cyst. A pronounced solid consistency of the growth is common to ovarian fibromata, sarcomata, endotheliomata, carcinomata, and teratomata.

It should not be forgotten that cystic conditions can complicate in all these tumor formations. As a rule, ascites is present, and this, by increasing the difficulty of palpation, renders the diagnosis more uncertain. The fibromata and the fibrosarcomata are less nodular, of quite firm consistence, and are more frequently situated upon one side. Sarcomata and endotheliomata are generally softer. The solid carcinomata are mostly bilateral, quite nodular, and offer a sensation of toughness. There are no positive indications that a tumor is benign or malignant, as a cystadenoma may contain masses of cancer material. Ascites is generally regarded as an indication of malignancy, but it occurs in pseudomucin cysts, papillary growths, and with the fibromata. Hard consistency and an irregular surface are also reasons for suspicion, but are not positive indications. Early adhesions of the vault of the tumor, by which the vaginal wall is shoved over it, is an indication of malignancy, when abscess formation can be excluded.

The age of the patient is of little significance, as the age of puberty is inclined to the formation of cancer, and all varieties of ovarian tumor can occur at any period of life. Proper metastases, as distinguished from peritoneal implantation, are of significance, but it is not always easy to demonstrate these metastases, as they do not always cause symptoms, or are not perceptible because of the abundant ascites. In other cases metastases will have been discovered in the vagina, the parametrium, and the rectal and peripheral lymph-glands before operation, fixing the diagnosis of malignancy without question. Pronounced cachexia and marasmus may be produced by certain complications, such as rupture, torsion, and inflammation; also in tumors of enormous size. Rapid growth, especially in children, speaks for malignancy. Olshausen directs attention to the premature edema of a leg as a symptom of cancer.

634. Exploratory Puncture.—In obscure and complicated cases it was formerly the rule before resort to operation to draw off a portion of the cyst-contents for chemic and microscopic examination. The fluid may have such pronounced physical properties as to reveal the true character. The thick colloid material from proliferating cysts can be mistaken for nothing else. If the fluid is serous, the possibilities of origin are numerous. It may have been furnished by a parovarian cyst, a serous ovarian tumor, a cystadenoma, ascites, hydronephrosis, and echinococcus sacs. In uncomplicated cases the fluid may possess such chemic properties as will aid in the differentiation, but frequently these properties are lost through complications, such as serous transudation and an admixture of blood. The fluid from a proliferating cyst is thick and colloid, with a specific gravity of from 1015 to 1030, and contains paralbumin and cylindric cells. In the papillary cysts there is an absence of paralbumin, while white blood-corpuscles are revealed by the microscope. The fluid from the Graafian follicles does not differ from that of the parovarian cysts. Ascitic fluid is thin and of a light yellow or greenish color, from which albumin is coagulated upon boiling, but no cylindric epithelium is found, and the specific gravity is from 1008 to 1015. In the cystic fibroma the fluid is of a lemon-yellow color, has a specific gravity of 1020, coagulates rapidly without heat, and contains no cylindric epithelium. The fluid from echinococcus cysts presents hooklets, has a specific gravity of from 1008 to 1010, and does not contain albumin. In hydronephrosis the fluid is thin, with a specific gravity of from 1005 to 1018; its color varies, and it contains urea, leucin, tyrosin, and kreatinin. Puncture of a cyst is always attended with danger, and when performed in doubtful cases, for diagnostic purposes only,—as in the echinococcus cysts, renal tumors, abscesses, and dermoids,—is attended with the most serious consequences: the intestines and bladder have frequently been punctured; fluid may escape into the peritoneal cavity and cause peritonitis; or air may enter the sac and result in inflammation and suppuration; a large vessel in the sac-wall has been injured, and a severe and dangerous hemorrhage has resulted. Neither chemic nor microscopic examination of the cyst-contents affords positive information, and the inferences thus secured do not compensate for the increased danger the patient undergoes.

635. Exploratory Incision.—In cases in which we find it impossible to arrive at a positive diagnosis, as in tubercular peritonitis, in malignant disease of the ovary, tube, or omentum, or in papillary cysts, a button-hole incision, sufficiently large to permit the introduction of the finger, will be a far safer procedure than puncture, and will afford an opportunity to determine the condition by touch, and will permit subsequent drainage. It should be done under all antiseptic precautions, and every preparation should be made to complete the operation if the conditions will permit. While this procedure is unattended with great danger, its indiscriminate practice is unjustifiable. It should be utilized to secure information that may as well be secured by the bimanual examination. When the latter procedure has demonstrated an inoperable malignant condition, for instance, the incision should not be made merely for confirmation of the decision.

636. Treatment.—That an ovarian cyst is not amenable to medicinal treatment is evident when we consider that the fluid is contained within a shut sac, which has its own secreting surface. The administration of remedies, and the application of counter-irritants with a view to increase secretion and elimination, must be without avail. Electrolysis has had its advocates, but when we consider the character of these growths, and the danger from infection many of them must present, the folly of such treatment is evident. Surgical treatment should consist in extirpation. Puncture is but a palliative procedure at best, for the removal of the fluid is quickly followed by its re-formation, and it requires more and more frequent withdrawal, which proves a severe drain, through the great loss of albumin. As has been stated, it is associated with danger from the puncture of a large vessel in the tumor wall, and the consequent hemorrhage; from the possibility of infection by escape of the contents of a papillary cyst, or the rupture of so thin-walled a cyst and the escape of its contents into and over the peritoneal cavity; and, lastly, from septic infection. Puncture may be resorted to as a temporary measure in a tumor complicating pregnancy, when the cyst is so situated as to form an obstruction to labor, and then should be performed through the vagina, after the most thorough cleansing of that canal. Puncture of a cyst through the rectum, under any circumstances, is an unjustifiable procedure.

637. Ovariotomy.—Extirpation of the tumor, or, as the operation is known, ovariotomy, is the only operation worthy of consideration as applicable to all cases. Success in its performance will depend very much upon the care with which the diagnosis has been made, the knowledge of the operator as to the condition of the patient, the dexterity with which the operation is performed or the readiness in meeting complications, and the judicious treatment of the patient subsequent to its performance.

638. Indications.—The recognition of the danger of every operation upon the peritoneum led the early operators to postpone interference until the patient had begun to experience marked discomfort and was suffering in general health from the pressure of the growth. The introduction of the principles of antisepsis and asepsis have rendered postponement unnecessary. A more careful study of the progress of the growths has demonstrated that it is unwise to postpone operation after a tumor has attained a growth sufficient to permit of diagnosis, because of the various complications which can develop. A large proportion of ovarian tumors are of a malignant character. Schultze places the proportion of malignancy at 27 per cent. of all ovarian tumors; Ruge, at 15 per cent. These variations are dependent upon their appreciation of the relation of papillary formations to malignancy. Pfannensteil found among 400 cases in which were included parovarian tumors that 19 per cent. were malignant. Reckoning the papillary adenomata, the number equaled 26.15 per cent.—a proportion that agrees with the estimates of Schultze and Leopold. It will be seen from these statements that about every fourth or fifth ovarian tumor can be considered malignant. The diagnosis of malignancy can not be made with certainty. If we recognize that the safety in these cases lies in the earliest possible extirpation, it will be evident that in one-half of all the cases the early extirpation of the tumor will be indicated. Absolutely benign growths of the ovary are unlimited in their size, and thus cause symptoms which imperil the life of the patient and lengthen the time required for recovery. Delay favors the development of complications, which, if they do not threaten life, create conditions that render the later operation more difficult and the prognosis less certain. These circumstances, with the present favorable prognosis of ovariotomy, render it desirable that every ovarian tumor should be subjected to operation as soon as it attains a size sufficient to permit of its diagnosis. It was formerly advised to wait until the tumor had reached a size that would permit it to rest upon the pelvis, but we now know no limit, and prefer to remove the tumor as soon as the patient's permission can be secured. Our inability to determine the exact character of the growth, and the possibility of very small papillary tumors infecting the entire abdominal cavity, make early operation advisable.

The severity of the symptoms only come into consideration as they assist the patient in arriving at a favorable decision. The difficulties of the operation should not be a cause for delay, as they will not become less by waiting. The stage of life plays no rôle in the decision unless the growth is complicated by acute tubal disease, which may render temporary delay desirable.

The indication for operation should be considered as urgent when the tumor begins to grow rapidly or when symptoms of threatening complications appear. Compression of the lungs, symptoms of uremia, of ileus, of intraperitoneal or intracystic hemorrhage, or rupture of the cyst must be considered as urgent or vital indications. More frequent complications are torsion of the pedicle and inflammation and suppuration of the cyst. The existence of peritoneal irritation has been considered as a reason for delay in operating, but now we realize that the patient has a much better prognosis through early operation than when it is delayed.

639. Contraindications.—The reasons for withholding operation may be transitory or permanent; the former, in severe complicating diseases, as intercurrent fevers, bronchial catarrh, especially in the aged, progressive weakness from loss of blood, or obstinate gastro-intestinal catarrh. The menstrual period is sometimes regarded as such a cause, but as it does not increase the danger of infection, it is no bar. The permanent contraindications are irrecoverable disease of the heart, lungs, kidneys, or liver, marasmus, especially senile, and such diseases as will in a short time certainly lead to death. While pulmonary tuberculosis, valvular disease of the heart, and nephritis are contraindications, ovariotomy occasionally decreases the danger from the lesion.

Age is no contraindication, as a number of successful operations after the age of eighty are reported. The mortality of 100 cases operated upon after the age of seventy was 12 per cent. (Kelly). Ovariotomy is not contraindicated by age unless the tumor is associated with some disease which will render death certain in a short time.

A number of anatomic contraindications were formerly recognized, among which were adhesions, intraligamentary growths, and the existence of malignity. Adhesions are no longer considered a reason for delay, and frequently the relation of the tumor to the broad ligament is discovered only during the operation. In the majority of cases the attempt at the operation only terminates with its completion. While the most trifling hope of recovery exists, and no traces of cachexia and metastasis formation are present, the operation should not be considered as contraindicated.

640. General Considerations.—Unless immediate operation is indicated by torsion of the pedicle, rupture of the cyst, or indications of cystic hemorrhage, two days should be occupied in the preparation of the patient, during which the pulse, temperature, condition of the respiratory organs, and urine can be studied. In complicated cases the procedure may be longer delayed, until the condition of the patient can be corrected. In very large cysts, with marked edema and dyspnea, many authors advocate a preliminary puncture, in order that the lungs and kidneys may have a few days to recover their functions before the major operation is performed. Because of its many disadvantages, this operation should be done very infrequently. For the performance of the operation the following assistants are desirable: first, a principal assistant, who stands opposite the operator; second, the anesthetist; third, a nurse or a physician to arrange and serve the ligatures and sutures; fourth, a second nurse, to care for the sponges; and, fifth, a nurse to serve in changing the water for the sponges and for the hands of the operator and his assistant. All these persons should be trained to know and to do their duty. Directions for their preparation are given. (Section 115.)

Instruments.—A knife, two pairs of scissors, two long dissecting forceps, twelve small and six large clamp forceps, two ligature carriers, a needle-holder, a trocar, a tube, two pairs of cyst forceps, and two short and four long curved needles, each threaded with a double silk loop for carriers, should be provided. The instruments should be carefully sterilized and placed in sterile trays. The patient should be placed upon a suitable table, with her feet toward a good light. An ordinary kitchen table will serve well. The operator stands to the patient's left and his assistant opposite. To the right of the operator is a table, upon which are placed the tray containing the instruments; a smaller one, for the needles and ligatures; and a basin with sterile water, for the hands of the operator, which should be changed as often as it becomes soiled. Behind the principal assistant stands another table, on which are two basins for the sponges or pads, and a third for the assistants' hands. The soiled sponges are washed out in one of these basins and placed in the other, from which they are squeezed out and handed to the assistant for the operation. These sponges should be accurately counted before the operation is begun, and all should be accounted for before the wound is closed. Want of care may result in the retention of a sponge, a pad, or even an instrument within the abdominal cavity, to the great disadvantage of the patient and to the discredit of the surgeon. A third table should hold the dressings, ready for application. There should be on hand in the room hot

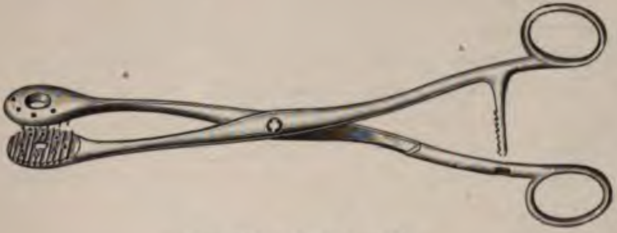
Fig. 520.—Cyst Forceps.

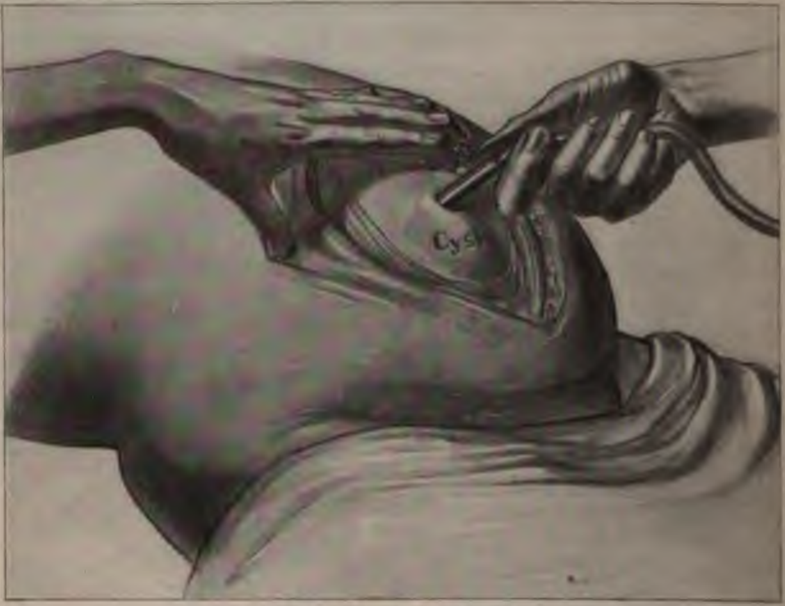

Fig. 521.—Wall Incised; Cyst Exposed.

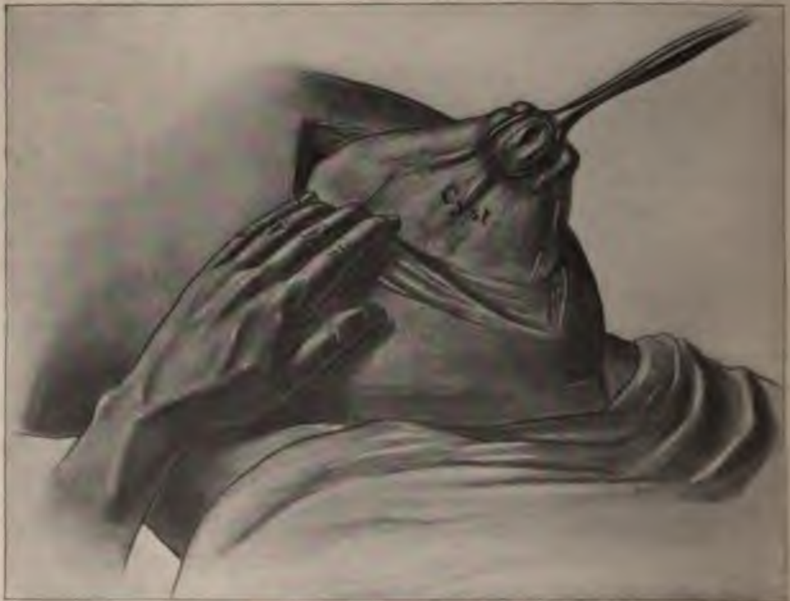

Fig. 522.—Cyst Punctured and Being Withdrawn.

and cold sterilized water, at least five gallons of each, slop buckets, a normal salt solution for irrigation of the abdominal cavity, and a suitable apparatus for hypodermocleisis or transfusion, if the condition of the patient should demand it. In addition, there should be within the reach of the anesthetizer a hypodermic syringe and solutions of strychnin and atropin.

641. Operation.—The description of the operation we prefer to divide into steps or stages, and to describe the method of procedure in each. We can thus afford the operator a graphic outline of the various accidents which can occur, and the methods to which he may be compelled to resort as he proceeds. He will be unlikely to mistake his course on the journey if an accurate chart of each portion is furnished him. The different stages are:

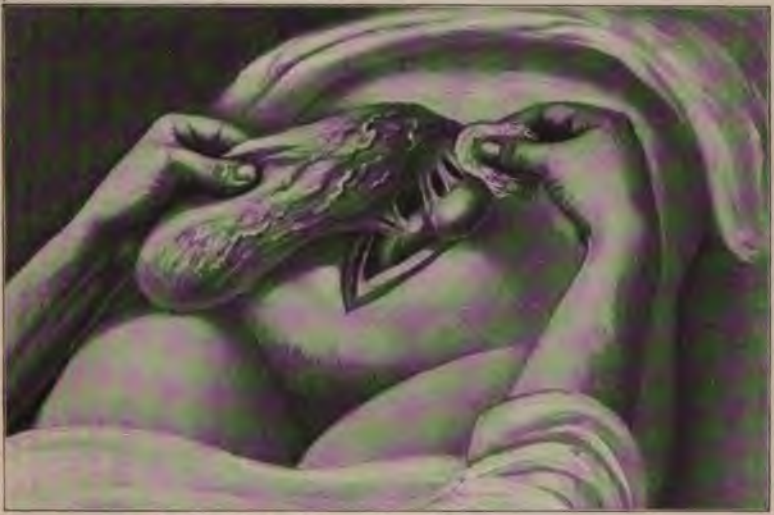

Fig. 523.—Withdrawal of Sac, Showing Adhesions.

1. Incision of the abdominal wall. (Section 133.)
2. Puncture and evacuation of the cyst.
3. Removal of the cyst and management of the adhesions. (Section 134.)
4. Management of the pedicle.
5. Toilet of the peritoneum. (Section 135.)
6. Drainage. (Sections 136, 137, 138, 139, and 140.)
7. Closure of the wound. (Section 141.)
8. Dressing. (Section 142.)

2. Puncture and Evacuation of the Cyst.—A number of more or less ingenious trocars have been devised for evacuating the contents of the cyst. What is required is a cannula with a tube attached, through which the fluid can be carried to a receptacle beneath the table. The simpler and more readily cleansed this apparatus, the better. A glass nozle for a fountain syringe, together with three feet of rubber tubing, will answer every purpose. In the absence of a cannula the cyst can be as readily emptied by puncture with a knife, but at the expense of greater soiling of the clothing.

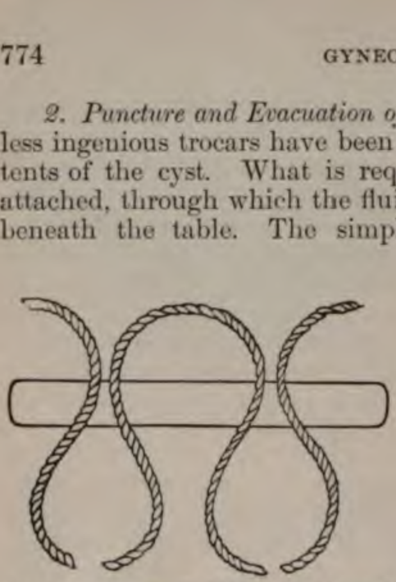
Fig. 524.—Ligatures Introduced through Broad Pedicle.

The point chosen for puncture should be situated toward the upper portion of the wound, so that the contraction of the emptying cyst will not draw the opening within the abdomen. Large vessels in the cyst-wall should be avoided. Gauze pads are placed about the wound margin, while the assistant makes continued pressure with both hands upon the upper part of the cyst, keeping it firmly pressed against the wound. The sac-wall is seized with pressure forceps or cyst-forceps, and its opening is kept beyond the wound margin as the cyst becomes relaxed. In nonadherent cysts this procedure will permit the removal of the sac, when empty, without any soiling of the abdominal cavity. In multilocular cysts the largest cyst exposed is first evacuated, through which succeeding cysts may be evacuated, drawing the first out to serve as a funnel. Areolar and dermoid cysts are best removed without effort at their reduction, because their contents are irritating to the peritoneal cavity and difficult to remove from it. Occasionally, the cyst-contents are so viscid that they refuse to run through the cannula. The edges of the puncture are seized and the sac is drawn forcibly against the

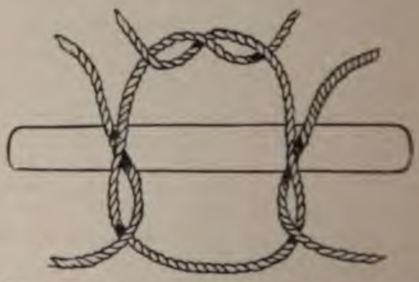
Fig. 525.—Interlacing of Sutures to Prevent Splitting of Pedicle.

wound, while the opening is enlarged and the jelly-like contents are scraped away.

4. Management of the Pedicle.—When the tumor is large and heavy, the pedicle may be seized with clamp forceps and the cyst cut away, after which the vessels can be separately ligated; or the pedicle may be transfixed with a ligature carried in a Deschamps needle, and the ligatures securely tied. The forceps are relaxed as the ligatures are drawn.

Short, thick pedicles should be ligated in several sections, and the ligatures should interlace, in order to prevent the pedicle from splitting. In a cyst without a pedicle the sac should be enucleated and the vessels secured as the operation proceeds. These cases present some of the most trying problems within the realm of abdominal surgery. In cutting away the tumor the precaution must be exercised to retain a sufficient button to prevent the ligature from slipping. If a ligature slips on a short, broad pedicle, the parts spread out, the vessels retract, and serious hemorrhage occurs, which may be difficult to control. Sometimes the ovarian or uterine artery slips back and forms a hematoma in the stump, which so fills up the tissues as to make traction upon the ligature and to withdraw the tissue, from which a fatal hemorrhage follows. The tendency of the tissue external to the ligature to shrink after the removal of the tumor should not be forgotten, and when the traction is severe, a second ligature may be judiciously placed behind it to inclose the ovarian artery. In very thick pedicles it may be well to form a groove for the ligature by crushing the tissues with strong forceps previous to its application. Silk, wire, and animal ligature have been employed for securing the pedicle. Silk, from its strength, ease of preparation, and small amount of material required, is most frequently employed. I prefer the chromicized catgut, but the precaution must be exercised to tie it tight and to leave a secure button, because of its greater propensity to slip. Other methods of securing hemostasis have been employed: the vessels have been twisted; for many years the pedicle was brought out of the wound and clamped; Keith applied a temporary clamp and charred the tissues with the hot iron; recently Skene has improvised a set of electrocautery clamps, by which the tissues are

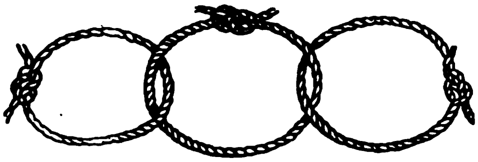
Fig. 526.—Sutures Interlaced and Tied.

slowly burned through and the application of the ligature is avoided.

General Consideration.—The study of the differential diagnosis of ovarian tumors should have prepared the operator to appreciate the fact that, after the most careful investigation of his cases, he must not infrequently expect to meet with conditions entirely different from those which the physical signs have indicated. Not infrequently what appears a simple ovarian cyst will present complications that it will test the ingenuity of the most experienced operator to overcome. The inexperienced operator should prepare himself for every emergency, and should have previously planned for them, as the prudent general plans for the coming battle. The more carefully the case has been studied, the patient prepared, and the emergencies anticipated, the more certain will be the success. It is far better to go to unnecessary preparation many times than to be unprepared once. Patients with large ovarian cysts frequently suffer from pressure symptoms, and are greatly benefited by previous purgation, stimulations of the secretion of the kidneys and skin, and the administration of strychnin and atropin to strengthen the action of the heart and vessels. In the incision care is exercised to avoid

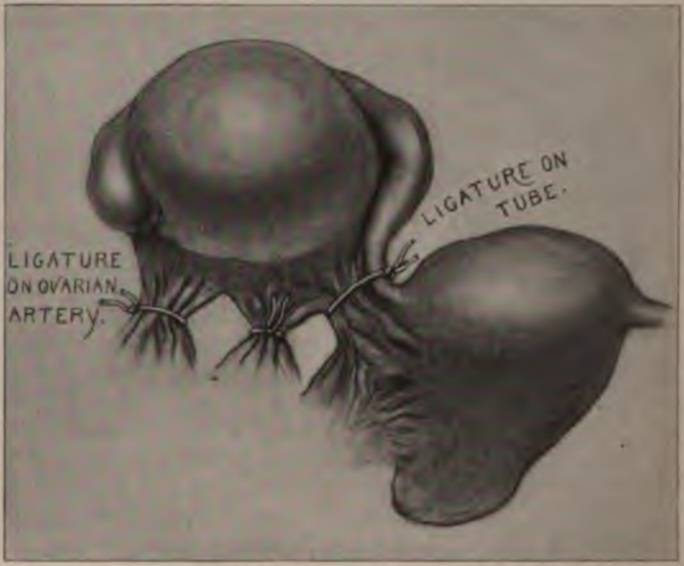

Fig. 527.—Splitting of Pedicle when Sutures are Tied without Interlacing.

pushing off the peritoneum and to escape injuring the bladder, a loop of intestine, or the cyst. The bladder may be drawn up to a higher level by adhesions to the cyst. It is recognized by the arrangement of the muscle-fibers in its wall. The parietal peritoneum is occasionally inseparable from the surface of the tumor along the line of incision, when the cyst may be opened and emptied before proceeding to the separation of the adhesions.

The intestine is rarely in danger of injury during this stage of the procedure, but occasionally a loop may be situated in front of the cyst.

The removal of a cyst should be followed by the examination of the remaining ovary. Frequently it will be found to be the site of a cyst which would otherwise be overlooked.

The toilet of the peritoneum should not be understood to mean thorough drying of the cavity; indeed, much sponging and manipulation of the peritoneum is injurious, and favors the formation of adhesions. The cavity is most readily cleansed, and with the least injury, by irrigation with normal salt solution. The retention of a considerable quantity of the fluid is beneficial, in that it favors peristalsis, and by its absorption replenishes the liquid waste. Ragged omentum and shreds or bands of adhesions should be removed. When the irrigating fluid continues to come away bloody, careful examination should be instituted to ascertain the source of the bleeding. The abdomen must not be closed while a considerable quantity of blood is being lost.

Post-operative Treatment. (Section 143.)

642. Incomplete Operation.—The conditions in which the operation has not been completed are most frequently those of intraligamentary parovarian cysts, and particularly papillary cysts. The structure of the broad ligament is more or less involved, and not infrequently adhesions affect a large portion of the intestine. The more experienced the operator, the less frequently will the incomplete operation be performed. With judicious measures, cases in which the operation can not be completed are exceedingly rare. In the intraligamentary variety an incision of the peritoneum, where it is situated about the base of the tumor, is made, the tumor is drawn up, forming a pedicle, and the tissue is pushed off by blunt dissection. Sometimes the tumor may be opened and an incision made at its base, by which the sac is then dissected out. Frequently it is advisable to precede the operation by ligation of the larger vessels, particularly the ovarian arteries, after which the dissection can be accomplished with less hemorrhage. The adhesions, when cords and bands, may be cut with the Paquelin cautery. In the papillary variety it is very important that the mass should be removed, even if it is necessary to extirpate the uterus to accomplish it. Frequently what seem desperate cases recover when the original source of the disease is removed, even though extensive infection of the peritoneal cavity already exists. When adhesions are very extensive and the condition of the patient such as to preclude the possibility of complete removal of the sac, its cavity should be emptied, cleansed, and sutured to the parietal peritoneum of the abdominal wall, while the remaining portion of the wound is closed. The sac cavity is packed with iodoform gauze. Thus it may be kept open, irrigated from time to time with disinfectant solutions, and the packing renewed until the cavity fills by granulation. This procedure is necessarily attended with increased danger to the patient, as it is impossible to keep such a wound completely aseptic.

When the tumor is deeply situated in the pelvis, the abdominal opening may be closed after an incision has been made through the base of the tumor into the vagina, through which the end of the gauze packed into the cyst may be carried. Over this gauze the cyst-wall is closed, and covered, when possible, with peritoneal flaps. Intraligamentary tumors are sometimes pushed up into the mesentery, and the removal of the mass necessitates the ligation of important branches of the mesenteric artery. When a large portion of mesentery is thus ligated, the vitality of the portion of intestine supplied by it is endangered and gangrene of the gut may result. Such cases may demand the excision of the affected portion of the intestine and end-to-end anastomosis. In metastasis of the papillary variety into the omentum, forming, as it frequently does, good-sized masses involving the entire omentum, the latter should be removed after ligation of its base with a number of catgut ligatures. It was my privilege, in a patient who had double-sided papillary ovarian cysts, with extensive ascites from the infected peritoneum, and who had been subjected three times to abdominal section for the evacuation of this fluid, to remove both ovaries and the greater part of the uterus after an extensive dissection. The entire omentum was also removed. This patient, in whom the dropsical effusion had previously collected so rapidly that they were unable to get her out of bed after the previous operations before the fluid had reaccumulated, had no recurrence of effusion subsequent to the complete operation, and two years later was in good health.

643. **Rupture of the Cyst.**—In cysts of the glandular variety which have been greatly distended, or when the pedicle is partly twisted, the cyst-wall becomes fragile and is easily torn, permitting its contents to escape into the abdominal cavity. This

accident is not a serious one unless the cyst-contents have undergone degeneration, as in suppurating cysts, or are irritating in character, as in the dermoid varieties. Tearing the cyst-wall will necessitate a thorough irrigation of the abdominal cavity to neutralize or to remove the contents.

644. Hemorrhage.—The site of the hemorrhage will greatly influence its character. In large cysts with extensive adhesions hemorrhage may take place from the cyst-wall or from vessels that have been torn within its walls and threaten a fatal result. The adhesions should be separated rapidly, the cyst raised, and its pedicle secured to cut off the blood supply. The larger and more vascular adhesions should be separated between ligatures or clamp forceps. If the hemorrhage threatens life, the assistant may place his hand within the abdomen, compress the abdominal aorta, and maintain the pressure until the operation is completed. Such a procedure prevents the further supply of blood, and so arrests the bleeding. Hemorrhage may occur from a very extensive surface, particularly when malignant disease has been the subject of removal, or extensive papillary growths which are intraligamentary or behind the uterus. Fatal syncope and death may follow the removal of very large tumors as a result of decreased abdominal pressure. The vessels relieved from pressure become distended by the blood, and form extensive reservoirs, by which so much of the blood is withdrawn from the circulation as to cause cerebral anemia and the death of the patient. Such a patient can be said to have bled into her own vessels. Such an occurrence is likely to take place only in very large tumors, and may partly be obviated by emptying the cyst slowly. When syncope occurs, the head should be lowered, and an assistant may compress the abdominal aorta with the hand in the abdomen, while the treatment of the pedicle and the toilet of the abdomen proceed. Occasionally, it may be necessary to remove the uterus on account of the free bleeding from its torn and denuded surfaces. The vitality of the patient may be maintained by hypodermic injections of strychnin, a hypodermic injection of atropin ($\frac{1}{100}$ of a grain) to contract the blood-vessels, and a hypodermocleisis of normal salt solution, the latter poured into the abdominal cavity while the patient is in the Trendelenburg posture, or the normal salt solution transfused directly into the vein. The latter measure affords the increased quantity of fluid by which the vessels can be filled and the heart have something upon which to contract.

645. Visceral Injuries.—Injuries to the intestine are possible during complicated operations. In making the abdominal incision it is important that the peritoneum should be raised with forceps, and a small opening made, to prevent not only injury of the cyst-wall, but of a possible loop of intestine which may be adherent over it. With the opening, the incision in the peritoneum can be extended the full length of the external wound by holding it up and incising it under the eye. In very dense adhesions the intestines may be torn into, or even across, during the progress of the operation. When such a lesion occurs, the parts should be carefully repaired at once, and measures should be taken to prevent soiling the peritoneal cavity with the bowel-contents. The intestine should be carefully sutured, and when torn through to such a degree as to render its vitality uncertain, resection should be done and an end-to-end anastomosis made. This procedure is accomplished very quickly with the Murphy button. In the absence of the button, the anastomosis may be performed by first suturing the mesenteric surface of the bowel by a single suture, another just opposite to this, and then one on each side between the first two. This divides the bowel into four sections, each section of which can be rapidly closed by continuous suture. The needle is passed through the loop of these sutures at every other insertion, which prevents puckering and contraction of the lumen of the bowel. The first row of sutures should be covered by a second, and this also covers over the sutures we have employed to maintain the ends together.

The most difficult cases for suture are those in which the rectum has been torn low down in the pelvis. Portions of the bowel may be so devitalized that they will not subsequently hold, and a fecal fistula follows. In all cases in which the injury of the bowel has been extensive, and its condition endangered, the parts should be packed with iodoform gauze, which affords a vent in case union is not complete. Complete closure of the wound should be interdicted, because the patient would develop a dangerous peritonitis before the occurrence of rupture is recognized. The position and relation of the ureter should be kept in mind in tumors situated low in the pelvis, or in those which are developed in the broad ligament, and particularly in the papillary forms of ovarian growth, as the organ may be pulled up or torn off in the enucleation of such masses. When the tumor is so situated as to endanger the injury of the ureter, it is better to dissect out the latter to make sure that it is uninjured. When it has been cut or torn, the preferable procedure is to establish an anastomosis with the bladder. If the ureter is so short as to render the traction so great upon the ureter as to endanger its union, the bladder should be anchored to the side of the pelvis in a position most favorable to relieve the tension. If the bladder and ureter can not be safely approximated, an end-to-end anastomosis of the severed ureter should be made. The ureter may be introduced into the descending colon or an attempt may be made to introduce its end into the ureter of the opposite side; but one should hesitate in attempting this, as failure means the imperiling of the unaffected kidney and ureter. Its end may be brought out through the skin and a urinary fistula established, but this means an exceedingly uncomfortable condition for the patient. One alternative is to ligate the ureter, which should be done with double ligature, as single ligature is likely under the absorption to become loose and to permit a subsequent leakage of urine. The urine is secreted until the pressure from the distended pelvis is equal to that of the blood pressure, when secretion no longer occurs. The organ unused becomes atrophied. Another alternative is the extirpation of the kidney, and, before attempting this, the operator should be well satisfied that the kidney on the opposite side is capable of doing the work.

The bladder may be injured during an operation. It may be drawn up over the anterior surface of the tumor and be incised, or its fundus may be removed before its true character is suspected. The peculiar interlaced muscular structure of the bladder-wall should permit its recognition. When it is opened or injured, it should be sutured. In a case of fibroid tumor in which it was my misfortune to cut away the entire summit of the bladder the walls were sutured, and the patient recovered. In such cases it is important that the bladder should be watched to prevent its becoming unduly distended during the convalescence. It should be frequently evacuated in order to avoid separation of weak union and leakage of urine.

646. Prognosis.—The result of the operation of ovariotomy will depend greatly upon the manner in which it has been conducted. With the exercise of every precaution, there will frequently be cases of delayed convalescence, owing to latent or preexisting pathologic conditions; but the danger is greatly increased when the operation has been carelessly performed and its details imperfectly practised. The operator and his assistants should have been so well trained that no deviation from the proper course, even though slight, will be overlooked. What avails the most rigid cleanliness of person, room, and instruments when a ligature is employed that has been dragged over blankets or unclean tables before its introduction? when the wound is dusted with iodoform from a box that has been standing open, and has been used in all sorts of cases about a ward? when the operator rubs his nose, scratches his head, or touches nonsterilized objects, and introduces the hand into the abdominal cavity without precautionary cleansing? Such indiscretions are often responsible for stitch abscesses and other septic processes. Pus collections and cellular inflammations in the pelvis in the region of the uterus frequently result from infection of serous collections in Douglas' pouch. Elevation of temperature, rapid pulse, and abdominal tenderness subsequent to the fourth or fifth day should lead to careful exploration for their origin. A mass of exudation in the pelvis should be considered an indication for vaginal incision, for the administration of salines until free purgation is secured, and for the use of rectal and vaginal enemata of hot water at least twice daily. The vaginal incision should be a free one across the vault of the vagina, after which the cavity should be thoroughly irrigated with a normal salt solution and a good packing of iodoform gauze introduced. This procedure should be preceded by careful sterilization into the vagina.

647. Intestinal Complications.—In difficult operations inflammatory intestinal sequels are not infrequent. The intestines may be obstructed by twists, and this danger is aggravated by bands of inflammatory adhesions, or by openings in the omentum or mesentery, through which a knuckle of intestine can slip and become strangulated. Lacerations of the intestinal coat affect the peristaltic action, and may lead to paralysis of a section, with ensuing symptoms of obstruction. A twist or volvulus may become so fixed that nothing will pass it. In walls that are already weakened a fecal fistula will result. In a case some years ago in the Philadelphia Hospital an operation by a colleague was followed five weeks later by symptoms of obstruction, and the patient vomiting stercoraceous material. The abdomen was reopened and five feet of intestine were torn up, disclosing a distinct volvulus, which was untwisted, when the patient recovered after a prolonged convalescence. The importance of an early reopening of the abdomen in such a case can not be overestimated, as the obstruction may be due to strangulation of a knuckle of intestine beneath the inflammatory bands or to its inclosure between sutures of the wound. The latter is unlikely to occur when the wound is closed in the manner we have suggested.

648. Causes of Death.—Causes of death after ovariotomy are, as in hysterectomy, shock, hemorrhage, and peritonitis. These sequels are much less infrequent, however, as the operation for ovariotomy is more easily accomplished and the duration is shorter than in hysterectomy. Tetanus, which formerly occurred frequently after ovariotomy, is now extremely rare. Ileus may occur in the second week as a result of adhesions or twists of the intestine. Inability to accomplish the evacuation of the intestine by injections with the pelvis elevated, and especially when complicated with stercoraceous vomiting, should require the reopening of the abdomen. The mortality of ovariotomy is very slight—much less than formerly. This is partly due to the fact that operations are now performed early, and it is only in rare instances that the patients are subject to the deleterious action of the cyst. Early operation, before the patient experiences complications, is attended with very slight mortality. Thus, Martin in more than 1000 ovariotomies has but 2 per cent. mortality ; Olshausen reported his last 100 ovariotomies with only 4 deaths. The uncomplicated ovariotomy has practically no mortality.

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